Sobre las componentes irreducibles de la variedad de leyes de álgebra de Lie nilpotentes complejas de dimensión 8

APÉNDICE

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Introducción

Este apéndice consiste en una selección de las salidas impresas TEX que genera el programa.

Al enseñar estas salidas se pretende:

- Mostrar la naturaleza, magnitud y complejidad de los cálculos que intervienen en los desarrollos realizados en el trabajo.
- Dar una idea de qué es lo que se omite en el capítulo 3 de la Tesis. Lo normal es que entre una afirmación como

  'entonces ... y de aquí ...'

  y lo que le sigue, haya varias decenas de páginas como las aquí mostradas, además de otras muchas elaboraciones, unas con ordenador y otras con lápiz y papel.

Evidentemente este apéndice no está orientado a ser leido, excepto lo necesario para ilustrar estos aspectos del trabajo, y qué es lo que se ha omitido en su exposición. Por esto, hemos realizado una selección para que el volumen fuera razonable.

También queremos indicar que hemos evitado la impresión de expresiones excesivamente grandes (no tiene sentido, pues no van a ser interpretadas hasta que no se simplifiquen). Estas aparecen como *'demasiado grande'* en los listados, y casi siempre son **varias páginas** para un solo polinomio en muchas variables. Por ejemplo, algunas no tan grandes pueden verse en la etapa 1 de la sucesión característica $(5, \mathfrak{L}, 1)$, página 6.

Debemos resaltar que estas salidas impresas fueron una ayuda considerable, sobre todo por hacer posible su posterior interpretación. Sin embargo no son las que mejor muestran el discurso lógico que conduce a la obtención de las componentes irreducibles.

> De hecho, deben ser consideradas como *altos en el camino*, en los que se le pide al sistema que escriba un resumen del estado de la computación.

En realidad el trabajo se hace casi todo de forma interactiva con el sistema **Mathematica** utilizando lo que allí se llaman *Notebooks*, que permiten 'dialogar' con el ordenador y pedirle que realice lo que en cada momento parezca más conveniente. Para apreciar la capacidad de estos *Notebooks* no sirven papeles impresos, sino que es necesario verlos en acción.

Sucesión característica (6,1,1)

Etapa 1

Ley del Álgebra

$$[X_1, X_4] = X_3$$

$$[X_1, X_5] = X_4$$

$$[X_1, X_6] = X_5$$

$$[X_1, X_7] = X_6$$

$$[X_1, X_8] = X_7$$

$$[X_2, X_4] = a_3 X_3$$

$$[X_2, X_5] = a_3 X_4 + a_5 X_3$$

$$[X_2, X_6] = a_3 X_5 + a_5 X_4 + a_7 X_3$$

$$[X_2, X_7] = a_3 X_6 + a_5 X_5 + a_7 X_4 + a_9 X_3$$

$$[X_2, X_8] = a_3 X_7 + a_5 X_6 + a_7 X_5 + a_9 X_4 + a_{11} X_3 + a_{12} X_2$$

$$[X_3, X_8] = b_9 X_3 + b_{10} X_2$$

$$[X_4, X_6] = c_3 X_3$$

$$[X_4, X_7] = c_3 X_4 + c_5 X_3 - b_{10} X_2$$

$$[X_4, X_8] = c_3 X_5 + (b_9 + c_5) X_4$$

$$[X_5, X_6] = c_3 X_4 + d_1 X_3 + b_{10} X_2$$

$$[X_5, X_7] = 2c_3 X_5 + (d_1 + c_5) X_4 + d_3 X_3$$

$$[X_5, X_8] = 3c_3 X_6 + (d_1 + b_9 + 2c_5) X_5 + d_3 X_4 + d_5 X_3 + d_6 X_2$$

$$[X_6, X_7] = 2c_3 X_6 + (d_1 + c_5) X_5 + d_3 X_4 + e_1 X_3 - d_6 X_2$$

$$[X_6, X_8] = 5c_3 X_7 + (2d_1 + b_9 + 3c_5) X_6 + 2d_3 X_5 + (e_1 + d_5) X_4 + e_3 X_3$$

$$[X_7, X_8] = 5c_3 X_8 + (2d_1 + b_9 + 3c_5) X_7 + 2d_3 X_6 + (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3 + f_2 X_2$$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & a_3 & a_5 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & a_3 & a_5 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & a_3 & a_5 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_3 & a_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -b_{10} & 0 \\ -1 & -a_3 & 0 & 0 & 0 & c_3 & c_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & c_3 & b_9 + c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{10} & 0 & d_6 \\ 0 & -a_5 & 0 & 0 & 0 & d_1 & d_3 & d_5 \\ -1 & -a_3 & 0 & 0 & 0 & c_3 & d_1 + c_5 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2c_3 & d_1 + b_9 + 2c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3c_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -b_{10} & 0 & -d_6 & 0 \\ 0 & -a_7 & 0 & -c_3 & -d_1 & 0 & e_1 & e_3 \\ 0 & -a_5 & 0 & 0 & -c_3 & 0 & d_3 & e_1+d_5 \\ -1 & -a_3 & 0 & 0 & 0 & 0 & d_1+c_5 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2c_3 & 2d_1+b_9+3c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 5c_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{10} & 0 & d_6 & 0 & f_2 \\ 0 & -a_9 & 0 & -c_5 & -d_3 & -e_1 & 0 & f_1 \\ 0 & -a_7 & 0 & -c_3 & -(d_1+c_5) & -d_3 & 0 & e_3 \\ 0 & -a_5 & 0 & 0 & -2c_3 & -(d_1+c_5) & 0 & e_1+d_5 \\ -1 & -a_3 & 0 & 0 & 0 & -2c_3 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_1+b_9+3c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 5c_3 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & -(b_9+c_5) & -d_3 & -(e_1+d_5) & -e_3 & 0 \\ 0 & -a_7 & 0 & -c_3 & -(d_1+b_9+2c_5) & -2d_3 & -(e_1+d_5) & 0 \\ 0 & -a_5 & 0 & 0 & -3c_3 & -(2d_1+b_9+3c_5) & -2d_3 & 0 \\ -1 & -a_3 & 0 & 0 & 0 & -5c_3 & -(2d_1+b_9+3c_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -5c_3 & 0 \end{pmatrix}$$

Nilpotencia

$c_6^6 = -a_3b_{10}$

$c_3^7 = -5c_3(2a_3c_3^2d_6 - 2a_3c_3d_3b_{10} + a_3d_1^2b_{10} + 2a_3d_1c_5b_{10} + a_3c_5^2b_{10} - 2a_5c_3d_1b_{10} - 2a_5c_3c_5b_{10} + 4c_3^2a_7b_{10})$

$c_4^7 = -(13a_3c_3^2d_6 - 3a_3c_3d_3b_{10} - a_3d_1^2b_{10} - 2a_3d_1c_5b_{10} - a_3c_5^2b_{10} - 3a_5c_3d_1b_{10} - 3a_5c_3c_5b_{10} + 20c_3^4 + 16c_3^2a_7b_{10})$

$c_5^7 = -(2a_3c_3d_6 + a_3d_3b_{10} + a_5d_1b_{10} + a_5c_5b_{10} + 36c_3^3 + c_3a_7b_{10})$

$c_6^7 = a_3d_6 - 17c_3^2 + a_7b_{10}$

$c_2^8 =$ (demasiado grande ...)

$c_3^8 =$ (demasiado grande ...)

$c_4^8 =$ (demasiado grande ...)

$c_5^8 = -(3a_3d_1f_2 - a_3e_1d_6 - a_3f_1b_{10} + 4a_3b_9f_2 + 6a_3c_5f_2 - a_3d_6d_5 - 5a_5c_3f_2 - 2a_5d_3d_6 - a_5e_3b_{10} - 18c_3^2e_1 - 18c_3^2d_5 + 26c_3d_1d_3 + 51c_3d_3b_9 + 60c_3d_3c_5 + 17c_3d_3a_{12} - c_3a_9d_6 - 4d_1^3 - 24d_1^2b_9 - 28d_1^2c_5 - 8d_1^2a_{12} + 4d_1a_7d_6 - 30d_1b_9^2 - 93d_1b_9c_5 - 20d_1b_9a_{12} - 59d_1c_5^2 - 31d_1c_5a_{12} + 5d_1a_{11}b_{10} + 4a_7b_9d_6 + 7a_7c_5d_6 - a_7d_5b_{10} - 10b_93 - 54b_9^2c_5 - 10b_9^2a_{12} - 87b_9c_5^2 - 36b_9c_5a_{12} + 4b_9a_{11}b_{10} - 39c_5^3 - 29c_5^2a_{12} + 9c_5a_{11}b_{10})$

$c_6^8 = -(a_3f_2 + 17c_3d_3 - 8d_1^2 - 20d_1b_9 - 31d_1c_5 - 5d_1a_{12} + a_7d_6 - 10b_9^2 - 36b_9c_5 - 5b_9a_{12} - 29c_5^2 - 9c_5a_{12} + a_{11}b_{10})$

$c_7^8 = 5d_1 + 5b_9 + 9c_5 + a_{12}$

Jacobi

$j_3^{248} = a_3a_{12}$

$j_3^{257} = 2a_5c_3$

$j_2^{258} = -2a_5b_{10}$

$j_3^{258} = 2a_5c_5 + a_5a_{12} + 3c_3a_7$

$j_4^{258} = a_3a_{12} + 2a_5c_3$

$j_2^{267} = 2a_5b_{10}$

$j_3^{267} = 2a_5d_1 + 3c_3a_7$

$j_4^{267} = 2a_5c_3$

$j_3^{268} = 2a_5d_3 + 6c_3a_9 + 3d_1a_7 + 3a_7c_5 + a_7a_{12}$

$j_4^{268} = 2a_5d_1 + 2a_5c_5 + a_5a_{12} + 6c_3a_7$

$j_5^{268} = a_3a_{12} + 4a_5c_3$

$j_2^{278} = -(2a_5d_6 - 5c_3a_{12} + 2a_9b_{10})$

$j_3^{278} = 2a_5e_1 + 5c_3a_{11} + 2d_1a_9 + 3d_3a_7 + 4a_9c_5 + a_9a_{12}$

$j_4^{278} = 2a_5d_3 + 6c_3a_9 + 3d_1a_7 + 3a_7c_5 + a_7a_{12}$

$j_5^{278} = 2a_5d_1 + 2a_5c_5 + a_5a_{12} + 6c_3a_7$

$j_6^{278} = a_3a_{12} + 4a_5c_3$

$j_3^{348} = a_3b_{10}$

$j_3^{358} = a_5b_{10}$

$j_4^{358} = a_3b_{10}$

$j_3^{368} = a_7b_{10}$

$j_4^{368} = a_5b_{10}$

$j_5^{368} = a_3b_{10}$

$j_2^{378} = 5c_3b_{10}$

$j_3^{378} = 5c_3b_9 + a_9b_{10}$

$j_4^{378} = a_7b_{10}$

$j_5^{378} = a_5b_{10}$

$j_6^{378} = a_3b_{10}$

$j_3^{456} = -a_3b_{10}$

$j_3^{457} = -a_5b_{10}$

$j_4^{457} = -a_3 b_{10}$

$j_3^{458} = -(a_3 d_6 - 3c_3^2)$

$j_3^{467} = a_3 d_6 + 3c_3^2 - a_7 b_{10}$

$j_4^{467} = -a_5 b_{10}$

$j_5^{467} = -a_3 b_{10}$

$j_2^{468} = -5c_3 b_{10}$

$j_3^{468} = c_3(3d_1 + b_9 + 9c_5)$

$j_4^{468} = 6c_3^2$

$j_2^{478} = -b_{10}(2d_1 + 2b_9 + 5c_5 - a_{12})$

$j_3^{478} = -(a_3 f_2 - 3c_3 d_3 - 2d_1 c_5 - b_9 c_5 - 4c_5 2 - a_{11} b_{10})$

$j_4^{478} = 3c_3 d_1 + 6c_3 b_9 + 9c_3 c_5 + a_9 b_{10}$

$j_5^{478} = 6c_3^2 + a_7 b_{10}$

$j_6^{478} = a_5 b_{10}$

$j_7^{478} = a_3 b_{10}$

$j_2^{567} = 5c_3 b_{10}$

$j_3^{567} = a_5 d_6 + 5c_3 d_1 - a_9 b_{10}$

$j_4^{567} = a_3 d_6 + 3c_3^2 - a_7 b_{10}$

$j_5^{567} = -a_5 b_{10}$

$j_6^{567} = -a_3 b_{10}$

$j_2^{568} = b_{10}(2d_1 + 2b_9 + 5c_5 - a_{12})$

$j_3^{568} = 6c_3 d_3 + 3d_1^2 + d_1 b_9 + 5d_1 c_5 + a_7 d_6 - a_{11} b_{10}$

$j_4^{568} = a_5 d_6 + 8c_3 d_1 + c_3 b_9 + 9c_3 c_5 - a_9 b_{10}$

$j_5^{568} = a_3 d_6 + 9c_3^2 - a_7 b_{10}$

$j_6^{568} = -a_5 b_{10}$

$j_7^{568} = -a_3 b_{10}$

$j_3^{578} = -(a_5 f_2 - 3c_3 e_1 - 3c_3 d_5 - 5d_1 d_3 - d_3 b_9 - 6d_3 c_5 - a_9 d_6)$

$j_4^{578} = -(a_3 f_2 - 9c_3 d_3 - 3d_1^2 - d_1 b_9 - 7d_1 c_5 - a_7 d_6 - b_9 c_5 - 4c_5^2)$

$j_5^{578} = a_5 d_6 + 11c_3 d_1 + 7c_3 b_9 + 18c_3 c_5$

$j_6^{578} = a_3 d_6 + 15c_3^2$

$j_2^{678} = -(5d_1 d_6 + 3e_1 b_{10} + 2b_9 d_6 + 7c_5 d_6 - d_6 a_{12} + 2d_5 b_{10})$

$j_3^{678} = 2c_3 e_3 + 3d_1 e_1 - 2d_1 d_5 + 2d_3^2 + e_1 b_9 + 7e_1 c_5 - a_7 f_2 + d_6 a_{11}$

$j_4^{678} = -(a_5 f_2 - 3c_3 e_1 - 3c_3 d_5 - 5d_1 d_3 - d_3 b_9 - 6d_3 c_5 - a_9 d_6)$

$j_5^{678} = -(a_3 f_2 - 9c_3 d_3 - 3d_1^2 - d_1 b_9 - 7d_1 c_5 - a_7 d_6 - b_9 c_5 - 4c_5^2)$

$j_6^{678} = a_5 d_6 + 11c_3 d_1 + 7c_3 b_9 + 18c_3 c_5$

$j_7^{678} = a_3 d_6 + 15c_3^2$

Sucesión característica (6,1,1)

Etapa 2

Sustituciones

$a_3 = 0$	[por el cambio de base $Y_2 = X_2 - a_3X_1, Y_i = X_i \forall i \neq 2$]
$a_5b_{10} = 0$	[de j_2^{267} en la etapa 1]
$a_5d_1 = 0$	[de j_3^{267} y j_4^{468} en la etapa 1]
$a_7b_{10} = 0$	[de j_3^{368} en la etapa 1]
$a_9b_{10} = 0$	[de j_3^{378} y j_4^{468} en la etapa 1]
$c_3 = 0$	[de j_3^{468} en la etapa 1]

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_5] = a_5X_3$

$[X_2, X_6] = a_5X_4 + a_7X_3$

$[X_2, X_7] = a_5X_5 + a_7X_4 + a_9X_3$

$[X_2, X_8] = a_5X_6 + a_7X_5 + a_9X_4 + a_{11}X_3 + a_{12}X_2$

$[X_3, X_8] = b_9X_3 + b_{10}X_2$

$[X_4, X_7] = c_5X_3 - b_{10}X_2$

$[X_4, X_8] = (b_9 + c_5)X_4$

$[X_5, X_6] = d_1X_3 + b_{10}X_2$

$[X_5, X_7] = (d_1 + c_5)X_4 + d_3X_3$

$[X_5, X_8] = (d_1 + b_9 + 2c_5)X_5 + d_3X_4 + d_5X_3 + d_6X_2$

$[X_6, X_7] = (d_1 + c_5)X_5 + d_3X_4 + e_1X_3 - d_6X_2$

$[X_6, X_8] = (2d_1 + b_9 + 3c_5)X_6 + 2d_3X_5 + (e_1 + d_5)X_4 + e_3X_3$

$[X_7, X_8] = (2d_1 + b_9 + 3c_5)X_7 + 2d_3X_6 + (e_1 + d_5)X_5 + e_3X_4 + f_1X_3 + f_2X_2$

Adjuntas

$$adjX_1 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_2 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_5 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_3 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_4 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -b_{10} & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & c_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_9 + c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_5 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{10} & 0 & d_6 \\ 0 & -a_5 & 0 & 0 & 0 & d_1 & d_3 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & d_1 + c_5 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_1 + b_9 + 2c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -b_{10} & 0 & -d_6 & 0 \\ 0 & -a_7 & 0 & 0 & -d_1 & 0 & e_1 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & d_3 & e_1+d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & d_1+c_5 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_1+b_9+3c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{10} & 0 & d_6 & 0 & f_2 \\ 0 & -a_9 & 0 & -c_5 & -d_3 & -e_1 & 0 & f_1 \\ 0 & -a_7 & 0 & 0 & -(d_1+c_5) & -d_3 & 0 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & -(d_1+c_5) & 0 & e_1+d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_1+b_9+3c_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & -(b_9+c_5) & -d_3 & -(e_1+d_5) & -e_3 & 0 \\ 0 & -a_7 & 0 & 0 & -(d_1+b_9+2c_5) & -2d_3 & -(e_1+d_5) & 0 \\ 0 & -a_5 & 0 & 0 & 0 & -(2d_1+b_9+3c_5) & -2d_3 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & -(2d_1+b_9+3c_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Nilpotencia

$$\begin{aligned} c_2^8 = {} & 2a_5d_3b_9^3d_6 + 8a_5d_3b_9^2c_5d_6 + 6a_5d_3b_9c_5^2d_6 + 4d_1^3b_9^2a_{12} + 4d_1^3b_9c_5a_{12} - 4d_1^3b_9a_{11}b_{10} - 4d_1^3c_5a_{11}b_{10} - \\ & 4d_1^2a_7b_9^2d_6 - 4d_1^2a_7b_9c_5d_6 + 8d_1^2b_9^3a_{12} + 28d_1^2b_9^2c_5a_{12} - 8d_1^2b_9^2a_{11}b_{10} + 20d_12b_9c_5^2a_{12} - 28d_1^2b_9c_5a_{11}b_{10} - \\ & 20d_1^2c_52a_{11}b_{10} - 4d_1a_7b_9^3d_6 - 16d_1a_7b_9^2c_5d_6 - 12d_1a_7b_9c_5^2d_6 + 5d_1b_9^4a_{12} + 31d_1b_9^3c_5a_{12} - 5d_1b_9^3a_{11}b_{10} + \\ & 59d_1b_9^2c_5^2a_{12} - 31d_1b_9^2c_5a_{11}b_{10} + 33d_1b_9c_5^3a_{12} - 59d_1b_9c_5^2a_{11}b_{10} - 33d_1c_5^3a_{11}b_{10} - a_7b_9^4d_6 - 7a_7b_9^3c_5d_6 - \\ & 15a_7b_9^2c_5^2d_6 - 9a_7b_9c_5^3d_6 + b_9^5a_{12} + 9b_9^4c_5a_{12} - b_9^4a_{11}b_{10} + 29b_9^3c_5^2a_{12} - 9b_9^3c_5a_{11}b_{10} + 39b_9^2c_5^3a_{12} - \\ & 29b_9^2c_5^2a_{11}b_{10} + 18b_9c_5^4a_{12} - 39b_9c_5^3a_{11}b_{10} - 18c_5^4a_{11}b_{10} \end{aligned}$$

$$\begin{aligned} c_3^8 = {} & 6a_5d_3b_9^2d_6+16a_5d_3b_9c_5d_6+6a_5d_3c_5^2d_6+4d_1^3b_9^2+4d_1^3b_9c_5+8d_1^3b_9a_{12}+4d_1^3c_5a_{12}-4d_1^3a_{11}b_{10}-8d_1^2a_7b_9d_6- \\ & 4d_1^2a_7c_5d_6 + 8d_1^2b_9^3 + 28d_1^2b_9^2c_5 + 24d_1^2b_9^2a_{12} + 20d_1^2b_9c_5^2 + 56d_1^2b_9c_5a_{12} - 16d_1^2b_9a_{11}b_{10} + 20d_1^2c_5^2a_{12} - \\ & 28d_12c_5a_{11}b_{10} - 12d_1a_7b_9^2d_6 - 32d_1a_7b_9c_5d_6 - 12d_1a_7c_5^2d_6 + 5d_1b_9^4 + 31d_1b_9^3c_5 + 20d_1b_9^3a_{12} + 59d_1b_9^2c_5^2 + \\ & 93d_1b_9^2c_5a_{12} - 15d_1b_9^2a_{11}b_{10} + 33d_1b_9c_5^3 + 118d_1b_9c_5^2a_{12} - 62d_1b_9c_5a_{11}b_{10} + 33d_1c_5^3a_{12} - 59d_1c_5^2a_{11}b_{10} - \\ & 4a_7b_9^3d_6 - 21a_7b_9^2c_5d_6 - 30a_7b_9c_5^2d_6 - 9a_7c_5^3d_6 + b_9^5 + 9b_9^4c_5 + 5b_9^4a_{12} + 29b_9^3c_5^2 + 36b_9^3c_5a_{12} - 4b_9^3a_{11}b_{10} + \\ & 39b_9^2c_5^3 + 87b_9^2c_5^2a_{12} - 27b_9^2c_5a_{11}b_{10} + 18b_9c_5^4 + 78b_9c_5^3a_{12} - 58b_9c_5^2a_{11}b_{10} + 18c_5^4a_{12} - 39c_5^3a_{11}b_{10} \end{aligned}$$

$$\begin{aligned} c_4^8 = {} & 6a_5d_3b_9d_6+8a_5d_3c_5d_6+8d_1^3b_9+4d_1^3c_5+4d_1^3a_{12}-4d_1^2a_7d_6+24d_1^2b_9^2+56d_1^2b_9c_5+24d_1^2b_9a_{12}+20d_1^2c_5^2+ \\ & 28d_1^2c_5a_{12} - 8d_1^2a_{11}b_{10} - 12d_1a_7b_9d_6 - 16d_1a_7c_5d_6 + 20d_1b_9^3 + 93d_1b_9^2c_5 + 30d_1b_9^2a_{12} + 118d_1b_9c_5^2 + \\ & 93d_1b_9c_5a_{12} - 15d_1b_9a_{11}b_{10} + 33d_1c_5^3 + 59d_1c_5^2a_{12} - 31d_1c_5a_{11}b_{10} - 6a_7b_9^2d_6 - 21a_7b_9c_5d_6 - 15a_7c_5^2d_6 + \\ & 5b_9^4 + 36b_9^3c_5 + 10b_9^3a_{12} + 87b_9^2c_5^2 + 54b_9^2c_5a_{12} - 6b_9^2a_{11}b_{10} + 78b_9c_5^3 + 87b_9c_5^2a_{12} - 27b_9c_5a_{11}b_{10} + 18c_5^4 + \\ & 39c_5^3a_{12} - 29c_5^2a_{11}b_{10} \end{aligned}$$

$$c_5^8 = 2a_5d_3d_6 + 4d_1^3 + 24d_1^2b_9 + 28d_1^2c_5 + 8d_1^2a_{12} - 4d_1a_7d_6 + 30d_1b_9^2 + 93d_1b_9c_5 + 20d_1b_9a_{12} + 59d_1c_5^2 + 31d_1c_5a_{12} - 5d_1a_{11}b_{10} - 4a_7b_9d_6 - 7a_7c_5d_6 + 10b_9^3 + 54b_9^2c_5 + 10b_9^2a_{12} + 87b_9c_5^2 + 36b_9c_5a_{12} - 4b_9a_{11}b_{10} + 39c_5^3 + 29c_5^2a_{12} - 9c_5a_{11}b_{10}$$

$$c_6^8 = 8d_1^2 + 20d_1b_9 + 31d_1c_5 + 5d_1a_{12} - a_7d_6 + 10b_9^2 + 36b_9c_5 + 5b_9a_{12} + 29c_5^2 + 9c_5a_{12} - a_{11}b_{10}$$

$$c_7^8 = 5d_1 + 5b_9 + 9c_5 + a_{12}$$

Jacobi

$$j_3^{258} = a_5(2c_5 + a_{12})$$

$$j_3^{268} = 2a_5d_3 + 3d_1a_7 + 3a_7c_5 + a_7a_{12}$$

$$j_4^{268} = a_5(2c_5 + a_{12})$$

$$j_2^{278} = -2a_5d_6$$

$$j_3^{278} = 2a_5e_1 + 2d_1a_9 + 3d_3a_7 + 4a_9c_5 + a_9a_{12}$$

$$j_4^{278} = 2a_5d_3 + 3d_1a_7 + 3a_7c_5 + a_7a_{12}$$

$$j_5^{278} = a_5(2c_5 + a_{12})$$

$$j_2^{478} = -b_{10}(2d_1 + 2b_9 + 5c_5 - a_{12})$$

$$j_3^{478} = 2d_1c_5 + b_9c_5 + 4c_5^2 + a_{11}b_{10}$$

$$j_3^{567} = a_5d_6$$

$$j_2^{568} = b_{10}(2d_1 + 2b_9 + 5c_5 - a_{12})$$

$$j_3^{568} = 3d_1^2 + d_1b_9 + 5d_1c_5 + a_7d_6 - a_{11}b_{10}$$

$$j_4^{568} = a_5d_6$$

$$j_3^{578} = -(a_5f_2 - 5d_1d_3 - d_3b_9 - 6d_3c_5 - a_9d_6)$$

$$j_4^{578} = 3d_1^2 + d_1b_9 + 7d_1c_5 + a_7d_6 + b_9c_5 + 4c_5^2$$

$$j_5^{578} = a_5d_6$$

$$j_2^{678} = -(5d_1d_6 + 3e_1b_{10} + 2b_9d_6 + 7c_5d_6 - d_6a_{12} + 2d_5b_{10})$$

$$j_3^{678} = 3d_1e_1 - 2d_1d_5 + 2d_3^2 + e_1b_9 + 7e_1c_5 - a_7f_2 + d_6a_{11}$$

$$j_4^{678} = -(a_5f_2 - 5d_1d_3 - d_3b_9 - 6d_3c_5 - a_9d_6)$$

$$j_5^{678} = 3d_1^2 + d_1b_9 + 7d_1c_5 + a_7d_6 + b_9c_5 + 4c_5^2$$

$$j_6^{678} = a_5d_6$$

Sucesión característica (6,1,1)

Etapa 3

Sustituciones

$a_3 = 0$	[etapa 2]
$a_5 b_{10} = 0$	[etapa 2]
$a_5 d_1 = 0$	[etapa 2]
$a_7 b_{10} = 0$	[etapa 2]
$a_9 b_{10} = 0$	[etapa 2]
$c_3 = 0$	[etapa 2]
$a_5 d_6 = 0$	[de j_2^{278} en la etapa 2]
$c_5 = -b_9$	[de nilpotencia con $[X_4, X_8]$ en la etapa 2]
$d_1 = b_9$	[$2d_1 + b_9 + 3c_5 = 2(d_1 - b_9)$ es autovalor de $adj_{X_8}(2)$]
$a_{12} = -b_9$	[de $c_7^8(2)$, nilpotencia en $[X_4, X_8](2)$ y $d_1 = b_9$]

Ley del Álgebra

$$[X_1, X_4] = X_3$$

$$[X_1, X_5] = X_4$$

$$[X_1, X_6] = X_5$$

$$[X_1, X_7] = X_6$$

$$[X_1, X_8] = X_7$$

$$[X_2, X_5] = a_5 X_3$$

$$[X_2, X_6] = a_5 X_4 + a_7 X_3$$

$$[X_2, X_7] = a_5 X_5 + a_7 X_4 + a_9 X_3$$

$$[X_2, X_8] = a_5 X_6 + a_7 X_5 + a_9 X_4 + a_{11} X_3 - b_9 X_2$$

$$[X_3, X_8] = b_9 X_3 + b_{10} X_2$$

$$[X_4, X_7] = -b_9 X_3 - b_{10} X_2$$

$$[X_5, X_6] = b_9 X_3 + b_{10} X_2$$

$$[X_5, X_7] = d_3 X_3$$

$$[X_5, X_8] = d_3 X_4 + d_5 X_3 + d_6 X_2$$

$$[X_6, X_7] = d_3 X_4 + e_1 X_3 - d_6 X_2$$

$$[X_6, X_8] = 2d_3 X_5 + (e_1 + d_5) X_4 + e_3 X_3$$

$$[X_7, X_8] = 2d_3 X_6 + (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3 + f_2 X_2$$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -b_9 \\ 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_5 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -b_{10} & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & -b_9 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{10} & 0 & d_6 \\ 0 & -a_5 & 0 & 0 & 0 & b_9 & d_3 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -b_{10} & 0 & -d_6 & 0 \\ 0 & -a_7 & 0 & 0 & -b_9 & 0 & e_1 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & d_3 & e_1+d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{10} & 0 & d_6 & 0 & f_2 \\ 0 & -a_9 & 0 & b_9 & -d_3 & -e_1 & 0 & f_1 \\ 0 & -a_7 & 0 & 0 & 0 & -d_3 & 0 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & 0 & e_1+d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & b_9 & -b_{10} & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & 0 & -d_3 & -(e_1+d_5) & -e_3 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & -2d_3 & -(e_1+d_5) & 0 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & -2d_3 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Nilpotencia

$c_5^8 = -a_7 b_9 d_6$

$c_6^8 = -(a_7 d_6 + b_9^2 + a_{11} b_{10})$

Jacobi

$j_3^{258} = -3a_5 b_9$

$j_3^{267} = 2a_5 b_9$

$j_3^{268} = 2a_5 d_3 - a_7 b_9$

$j_4^{268} = -a_5 b_9$

$j_3^{278} = 2a_5 e_1 + 3d_3 a_7 - 3a_9 b_9$

$j_4^{278} = 2a_5 d_3 - a_7 b_9$

$j_5^{278} = -a_5 b_9$

$j_3^{478} = b_9^2 + a_{11} b_{10}$

$j_3^{568} = a_7 d_6 - b_9^2 - a_{11} b_{10}$

$j_3^{578} = -(a_5 f_2 - a_9 d_6)$

$j_4^{578} = a_7 d_6$

$j_2^{678} = -(3e_1 b_{10} + b_9 d_6 + 2d_5 b_{10})$

$j_3^{678} = 2d_3^2 - 3e_1 b_9 - a_7 f_2 - 2b_9 d_5 + d_6 a_{11}$

$j_4^{678} = -(a_5 f_2 - a_9 d_6)$

$j_5^{678} = a_7 d_6$

Sucesión característica (6,1,1)

Etapa 4

Sustituciones

$a_3 = 0$ [etapa 2]
$a_5 b_{10} = 0$ [etapa 2]
$a_5 d_1 = 0$ [etapa 2]
$a_7 b_{10} = 0$ [etapa 2]
$a_9 b_{10} = 0$ [etapa 2]
$c_3 = 0$ [etapa 2]
$a_5 d_6 = 0$ [de j_2^{278} en la etapa 2]
$b_9 = 0$ [si $b_{10} = 0$ por NIL en $[X_3, X_8](2)$ y si $b_{10} \neq 0 \neq b_9$, con el CB $Y_2 = b_9 X_2 + b_{10} X_3$]
$c_5 = 0$ [de (3) y $b_9 = 0$]
$d_1 = 0$ [de (3) y $b_9 = 0$]
$a_{12} = 0$ [de (3) y $b_9 = 0$]

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_5] = a_5 X_3$

$[X_2, X_6] = a_5 X_4 + a_7 X_3$

$[X_2, X_7] = a_5 X_5 + a_7 X_4 + a_9 X_3$

$[X_2, X_8] = a_5 X_6 + a_7 X_5 + a_9 X_4 + a_{11} X_3$

$[X_3, X_8] = b_{10} X_2$

$[X_4, X_7] = -b_{10} X_2$

$[X_5, X_6] = b_{10} X_2$

$[X_5, X_7] = d_3 X_3$

$[X_5, X_8] = d_3 X_4 + d_5 X_3 + d_6 X_2$

$[X_6, X_7] = d_3 X_4 + e_1 X_3 - d_6 X_2$

$[X_6, X_8] = 2 d_3 X_5 + (e_1 + d_5) X_4 + e_3 X_3$

$[X_7, X_8] = 2 d_3 X_6 + (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3 + f_2 X_2$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_5 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -b_{10} & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{10} & 0 & d_6 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & d_3 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -b_{10} & 0 & -d_6 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & d_3 & e_1+d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{10} & 0 & d_6 & 0 & f_2 \\ 0 & -a_9 & 0 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & -a_7 & 0 & 0 & 0 & -d_3 & 0 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & 0 & e_1+d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & -a_{11} & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & 0 & -d_3 & -(e_1+d_5) & -e_3 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & -2d_3 & -(e_1+d_5) & 0 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & -2d_3 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Nilpotencia

$c_6^8 = -(a_7 d_6 + a_{11} b_{10})$

Jacobi

$j_3^{268} = 2a_5 d_3$

$j_3^{278} = 2a_5 e_1 + 3d_3 a_7$

$j_4^{278} = 2a_5 d_3$

$j_3^{478} = a_{11} b_{10}$

$j_3^{568} = a_7 d_6 - a_{11} b_{10}$

$j_3^{578} = -(a_5 f_2 - a_9 d_6)$

$j_4^{578} = a_7 d_6$

$j_2^{678} = -b_{10}(3e_1 + 2d_5)$

$j_3^{678} = 2d_3^2 - a_7 f_2 + d_6 a_{11}$

$j_4^{678} = -(a_5 f_2 - a_9 d_6)$

$j_5^{678} = a_7 d_6$

Sucesión característica (6,1,1)

Etapa 4A

Sustituciones

$a_3 = 0, a_5 = 0, a_7 = 0, a_9 = 0, a_{11} = 0, a_{12} = 0$

$b_9 = 0$

$c_3 = 0, c_5 = 0$

$d_1 = 0, d_3 = 0$

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_3, X_8] = b_{10}X_2$

$[X_4, X_7] = -b_{10}X_2$

$[X_5, X_6] = b_{10}X_2$

$[X_5, X_8] = d_5X_3 + d_6X_2$

$[X_6, X_7] = e_1X_3 - d_6X_2$

$[X_6, X_8] = (e_1 + d_5)X_4 + e_3X_3$

$[X_7, X_8] = (e_1 + d_5)X_5 + e_3X_4 + f_1X_3 + f_2X_2$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -b_{10} & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{10} & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -b_{10} & 0 & -d_6 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{10} & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -(e_1 + d_5) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(e_1 + d_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$j_2^{678} = -b_{10}(3e_1 + 2d_5)$

Sucesión característica (6,1,1)

Etapa 4B

Sustituciones

$a_3 = 0, a_{12} = 0$

$b_9 = 0, b_{10} = 0$

$c_3 = 0, c_5 = 0$

$d_1 = 0, d_3 = 0, d_6 = 0$

$e_1 = 0$

$f_2 = 0$

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_5] = a_5 X_3$

$[X_2, X_6] = a_5 X_4 + a_7 X_3$

$[X_2, X_7] = a_5 X_5 + a_7 X_4 + a_9 X_3$

$[X_2, X_8] = a_5 X_6 + a_7 X_5 + a_9 X_4 + a_{11} X_3$

$[X_5, X_8] = d_5 X_3$

$[X_6, X_8] = d_5 X_4 + e_3 X_3$

$[X_7, X_8] = d_5 X_5 + e_3 X_4 + f_1 X_3$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & a_5 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_5 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & 0 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_9 & 0 & 0 & 0 & 0 & 0 & f_1 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & 0 & e_3 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{11} & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & 0 & 0 & -d_5 & -e_3 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & -d_5 & 0 \\ 0 & -a_5 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (6,1,1)

Etapa 4C

Sustituciones

$a_3 = 0, a_5 = 0, a_{12} = 0$

$b_9 = 0, b_{10} = 0$

$c_3 = 0, c_5 = 0$

$d_1 = 0, d_3 = 0, d_6 = 0$

$f_2 = 0$

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_6] = a_7 X_3$

$[X_2, X_7] = a_7 X_4 + a_9 X_3$

$[X_2, X_8] = a_7 X_5 + a_9 X_4 + a_{11} X_3$

$[X_5, X_8] = d_5 X_3$

$[X_6, X_7] = e_1 X_3$

$[X_6, X_8] = (e_1 + d_5) X_4 + e_3 X_3$

$[X_7, X_8] = (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_9 & 0 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & 0 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{11} & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & 0 & 0 & -(e_1 + d_5) & -e_3 & 0 \\ 0 & -a_7 & 0 & 0 & 0 & 0 & -(e_1 + d_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (6,1,1)

Etapa 4D

Sustituciones

$a_3 = 0, a_5 = 0, a_7 = 0, a_{12} = 0$

$b_9 = 0, b_{10} = 0$

$c_3 = 0, c_5 = 0$

$d_1 = 0, d_3 = 0, d_6 = 0$

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_7] = a_9 X_3$

$[X_2, X_8] = a_9 X_4 + a_{11} X_3$

$[X_5, X_8] = d_5 X_3$

$[X_6, X_7] = e_1 X_3$

$[X_6, X_8] = (e_1 + d_5) X_4 + e_3 X_3$

$[X_7, X_8] = (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3 + f_2 X_2$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & f_2 \\ 0 & -a_9 & 0 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -f_2 & 0 \\ 0 & -a_{11} & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & 0 & 0 & 0 & -(e_1 + d_5) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(e_1 + d_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (6,1,1)

Etapa 4E

Sustituciones

$a_3 = 0, a_5 = 0, a_7 = 0, a_9 = 0, a_{12} = 0$

$b_9 = 0, b_{10} = 0$

$c_3 = 0, c_5 = 0$

$d_1 = 0$

$2d_3^2 + d_6 a_{11} = 0$

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_8] = a_{11} X_3$

$[X_5, X_7] = d_3 X_3$

$[X_5, X_8] = d_3 X_4 + d_5 X_3 + d_6 X_2$

$[X_6, X_7] = d_3 X_4 + e_1 X_3 - d_6 X_2$

$[X_6, X_8] = 2 d_3 X_5 + (e_1 + d_5) X_4 + e_3 X_3$

$[X_7, X_8] = 2 d_3 X_6 + (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3 + f_2 X_2$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_4 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_5 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_3 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_6 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_3 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_7 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & -d_3 & 0 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adjX_8 = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & -a_{11} & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & 0 & 0 & -d_3 & -(e_1 + d_5) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & -2d_3 & -(e_1 + d_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -2d_3 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (6,1,1)

Etapa 4F

Sustituciones

$a_3 = 0, a_5 = 0, a_7 = 0, a_9 = 0, a_{11} = 0, a_{12} = 0$

$b_9 = 0, b_{10} = 0$

$c_3 = 0, c_5 = 0$

$d_1 = 0, d_3 = 0$

Ley del Álgebra

$[X_1, X_4] = X_3$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_5, X_8] = d_5 X_3 + d_6 X_2$

$[X_6, X_7] = e_1 X_3 - d_6 X_2$

$[X_6, X_8] = (e_1 + d_5) X_4 + e_3 X_3$

$[X_7, X_8] = (e_1 + d_5) X_5 + e_3 X_4 + f_1 X_3 + f_2 X_2$

Adjuntas

$$adj_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 + d_5 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$adj_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -(e_1 + d_5) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(e_1 + d_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (5, 2, 1)

Etapa 1

Ley del Álgebra

$[X_1, X_3] = X_2$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_3] = a_1 X_4$

$[X_2, X_6] = a_7 X_4$

$[X_2, X_7] = a_{10} X_2 + a_9 X_4 + a_7 X_5$

$[X_2, X_8] = a_{12} X_2 + a_{10} X_3 + a_{11} X_4 + a_9 X_5 + a_7 X_6$

$[X_3, X_5] = b_3 X_4$

$[X_3, X_6] = -2a_{10} X_2 + b_5 X_4 + (a_7 + b_3) X_5$

$[X_3, X_7] = b_8 X_2 - a_{10} X_3 + b_7 X_4 + (a_9 + b_5) X_5 + (2a_7 + b_3) X_6$

$[X_3, X_8] = b_{10} X_2 + (a_{12} + b_8) X_3 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + (3a_7 + b_3) X_7$

$[X_4, X_8] = -2d_4 X_2 + c_7 X_4$

$[X_5, X_7] = d_4 X_2 + d_3 X_4$

$[X_5, X_8] = d_6 X_2 - d_4 X_3 + d_5 X_4 + (c_7 + d_3) X_5$

$[X_6, X_7] = -(d_6 X_2) + d_4 X_3 + e_1 X_4 + d_3 X_5$

$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5 + (c_7 + 2d_3) X_6$

$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6 + (c_7 + 2d_3) X_7$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_{10} & a_{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{10} \\ 0 & 0 & a_1 & 0 & 0 & a_7 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & a_7 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & -2a_{10} & b_8 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & -a_{10} & a_{12}+b_8 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & a_7+b_3 & a_9+b_5 & a_{11}+b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2a_7+b_3 & 2a_9+b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3a_7+b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -2d_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -d_4 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7+d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2a_{10} & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & 0 \\ 0 & -a_7 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -(a_7+b_3) & 0 & 0 & 0 & d_3 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7+2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{10} & -b_8 & 0 & -d_4 & d_6 & 0 & f_2 \\ 0 & 0 & a_{10} & 0 & 0 & -d_4 & 0 & e_4 \\ 0 & -a_9 & -b_7 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & -a_7 & -(a_9+b_5) & 0 & 0 & -d_3 & 0 & e_3 \\ -1 & 0 & -2a_7-b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7+2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 2d_4 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & -a_{10} & -(a_{12}+b_8) & 0 & d_4 & 0 & -e_4 & 0 \\ 0 & -a_{11} & -b_9 & -c_7 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11}+b_7) & 0 & -(c_7+d_3) & -(d_5+e_1) & -e_3 & 0 \\ 0 & -a_7 & -2a_9-b_5 & 0 & 0 & -c_7-2d_3 & -(d_5+e_1) & 0 \\ -1 & 0 & -3a_7-b_3 & 0 & 0 & 0 & -c_7-2d_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : 2{a_7}^2 = 0$

$J_2 : 2a_7a_{10} = 0$

$J_3 : a_7a_{10} - a_{10}b_3 = 0$

$J_4 : a_7a_{10} + a_{10}b_3 = 0$

$J_5 : 3a_7a_{10} + a_{10}b_3 = 0$

$J_6 : 2a_9a_{10} + 2a_7a_{12} + a_{12}b_3 + a_{10}b_5 + a_7b_8 + b_3b_8 = 0$

$J_7 : 5a_7a_9 + 2a_1a_{12} + a_1b_8 - a_1c_7 = 0$

$J_8 : 2a_9a_{10} + a_7a_{12} + a_{12}b_3 + a_7b_8 + b_3b_8 - 2a_7d_3 = 0$

$J_9 : a_7a_{12} + a_{10}b_5 + 2a_7d_3 = 0$

$J_{10} : 2a_1d_4 = 0$

$J_{11} : -2a_7d_4 = 0$

$J_{12} : -2a_9d_4 = 0$

$J_{13}: -2a_{10}d_4 = 0$

$J_{14}: 2a_{10}d_4 = 0$

$J_{15}: -(a_{10}b_3) - a_1d_4 = 0$

$J_{16}: a_{10}b_3 - a_1d_4 = 0$

$J_{17}: a_7a_{10} + a_1d_4 = 0$

$J_{18}: 5a_7a_{10} + a_{10}b_3 + 2a_1d_4 = 0$

$J_{19}: 2a_{10}^2 - 2a_7d_4 = 0$

$J_{20}: -2a_{10}^2 + 2a_7d_4 = 0$

$J_{21}: -3a_7d_4 - b_3d_4 = 0$

$J_{22}: -(a_7d_4) - b_3d_4 = 0$

$J_{23}: 4a_{10}^2 - a_7d_4 - b_3d_4 = 0$

$J_{24}: a_7d_4 - b_3d_4 = 0$

$J_{25}: -3a_7d_4 + b_3d_4 = 0$

$J_{26}: -(a_{10}b_8) - a_{10}c_7 - 2a_{10}d_3 + 3a_9d_4 + 2b_5d_4 = 0$

$J_{27}: a_{12}b_3 + b_3b_8 - 3a_7d_3 - a_1d_6 = 0$

$J_{28}: 2a_9a_{10} - a_{10}b_5 + a_7b_8 - a_7d_3 + a_1d_6 = 0$

$J_{29}: a_{10}b_8 + a_{10}c_7 + 2a_{10}d_3 + 3a_9d_4 - 2a_7d_6 = 0$

$J_{30}: -(b_5d_4) + a_7d_6 = 0$

$J_{31}: -2a_9d_4 - b_5d_4 + a_7d_6 = 0$

$J_{32}: -2a_{10}b_8 - 2a_{10}c_7 - 4a_{10}d_3 + 2b_5d_4 + 2a_7d_6 = 0$

$J_{33}: -(a_{12}d_4) - b_8d_4 + 2c_7d_4 + 5d_3d_4 + a_{10}d_6 = 0$

$J_{34}: a_{10}a_{11} + a_9a_{12} + a_{12}b_5 + a_{10}b_7 + b_5b_8 + a_7b_{10} + 3a_9d_3 + 2b_5d_3 - a_7d_5 - a_7e_1 = 0$

$J_{35}: 2a_{10}a_{11} + a_{12}b_5 + b_5b_8 + a_7b_{10} + 2b_5d_3 - a_7d_5 - 3a_7e_1 - a_1e_4 = 0$

$J_{36}: -(a_{10}a_{11}) + a_9a_{12} + a_{10}b_7 + 3a_9d_3 + 2a_7e_1 + a_1e_4 = 0$

$J_{37}: -(b_{10}d_4) + d_4d_5 + a_{12}d_6 - 2c_7d_6 - 5d_3d_6 + 3d_4e_1 + 3a_{10}e_4 = 0$

$J_{38}: c_7d_3 + 3d_3^2 - a_{11}d_4 - b_7d_4 + a_9d_6 - b_3e_4 = 0$

$J_{39}: b_8^2 + 2a_{10}b_{10} + b_8c_7 + 2b_8d_3 + a_{11}d_4 + 3b_7d_4 - 2a_{10}d_5 - 3a_9d_6 - 2b_5d_6 - 2a_{10}e_1 - 2a_7e_4 - b_3e_4 = 0$

$J_{40}: a_{12}b_7 - a_{11}b_8 + b_7b_8 + a_{10}b_9 + a_9b_{10} + a_{11}d_3 + 3b_7d_3 - a_9d_5 + 2a_9e_1 + 2b_5e_1 - 2a_7e_3 - a_1f_2 = 0$

$J_{41}: -(b_9d_4) + a_{11}d_6 + c_7e_1 + 5d_3e_1 + a_9e_4 - b_5e_4 - a_7f_2 = 0$

Nilpotencia

$N_1 : 2a_{12} + b_8 + 4c_7 + 5d_3 = 0$

$N_2 : -{a_{10}}^2 - 3a_7d_4 - b_3d_4 = 0$

$N_3 : -(a_7a_{10}d_4) - a_{10}b_3d_4 = 0$

$N_4 : 2{a_7}^2{d_4}^2 + a_7{b_3}{d_4}^2 = 0$

$N_5 : {a_{12}}^2 + a_{12}b_8 - a_{10}b_{10} + 8a_{12}c_7 + 4b_8c_7 + 6{c_7}^2 + 10a_{12}d_3 + 5b_8d_3 + 15c_7d_3 + 8{d_3}^2 + 3a_{11}d_4 + b_7d_4 - a_9d_6 - 4a_7e_4 - b_3e_4 = 0$

$N_6 : 4{a_{12}}^2c_7 + 4a_{12}b_8c_7 - 4a_{10}b_{10}c_7 + 12a_{12}{c_7}^2 + 6b_8{c_7}^2 + 4{c_7}^3 + 5{a_{12}}^2d_3 + 5a_{12}b_8d_3 - 5a_{10}b_{10}d_3 + 30a_{12}c_7d_3 + 15b_8c_7d_3 + 15{c_7}^2d_3 + 16a_{12}{d_3}^2 + 8b_8{d_3}^2 + 16c_7{d_3}^2 + 4{d_3}^3 + 3a_{11}a_{12}d_4 + a_{12}b_7d_4 + 2a_{11}b_8d_4 - 2a_{10}b_9d_4 - a_9b_{10}d_4 + 9a_{11}c_7d_4 + 3b_7c_7d_4 + 14a_{11}d_3d_4 + 4b_7d_3d_4 - 4a_9d_4d_5 - b_5d_4d_5 + a_{10}a_{11}d_6 - a_9a_{12}d_6 + a_{10}b_7d_6 - a_9b_8d_6 - 3a_9c_7d_6 - 4a_9d_3d_6 + a_7d_5d_6 - 2a_9d_4e_1 - b_5d_4e_1 + a_7d_6e_1 - 5a_7d_4e_3 - b_3d_4e_3 + 2a_9a_{10}e_4 - 4a_7a_{12}e_4 - a_{12}b_3e_4 + a_{10}b_5e_4 - a_7b_8e_4 - 12a_7c_7e_4 - 3b_3c_7e_4 - 12a_7d_3e_4 - 3b_3d_3e_4 + 3a_7a_{10}f_2 + a_{10}b_3f_2 = 0$

$N_7 : 6{a_{12}}^2{c_7}^2 + 6a_{12}b_8{c_7}^2 - 6a_{10}b_{10}{c_7}^2 + 8a_{12}{c_7}^3 + 4b_8{c_7}^3 + {c_7}^4 + 15{a_{12}}^2c_7d_3 + 15a_{12}b_8c_7d_3 - 15a_{10}b_{10}c_7d_3 + 30a_{12}{c_7}^2d_3 + 15b_8{c_7}^2d_3 + 5{c_7}^3d_3 + 8{a_{12}}^2{d_3}^2 + 8a_{12}b_8{d_3}^2 - 8a_{10}b_{10}{d_3}^2 + 32a_{12}c_7{d_3}^2 + 16b_8c_7{d_3}^2 + 8{c_7}^2{d_3}^2 + 8a_{12}{d_3}^3 + 4b_8{d_3}^3 + 4c_7{d_3}^3 + 9a_{11}a_{12}c_7d_4 + 3a_{12}b_7c_7d_4 + 6a_{11}b_8c_7d_4 - 6a_{10}b_9c_7d_4 - 3a_9b_{10}c_7d_4 + 9a_{11}{c_7}^2d_4 + 3b_7{c_7}^2d_4 + 14a_{11}a_{12}d_3d_4 + 4a_{12}b_7d_3d_4 + 10a_{11}b_8d_3d_4 - 10a_{10}b_9d_3d_4 - 4a_9b_{10}d_3d_4 + 28a_{11}c_7d_3d_4 + 8b_7c_7d_3d_4 + 20a_{11}{d_3}^2d_4 + 4b_7{d_3}^2d_4 + 2{a_{11}}^2{d_4}^2 + 2a_{11}b_7{d_4}^2 - 2a_9b_9{d_4}^2 + 2a_{10}a_{11}d_4d_5 - 4a_9a_{12}d_4d_5 - a_{12}b_5d_4d_5 + 2a_{10}b_7d_4d_5 - 2a_9b_8d_4d_5 + a_7b_{10}d_4d_5 - 8a_9c_7d_4d_5 - 2b_5c_7d_4d_5 - 12a_9d_3d_4d_5 - 2b_5d_3d_4d_5 + 5a_7d_4{d_5}^2 + b_3d_4{d_5}^2 + 3a_{10}a_{11}c_7d_6 - 3a_9a_{12}c_7d_6 + 3a_{10}b_7c_7d_6 - 3a_9b_8c_7d_6 - 3a_9{c_7}^2d_6 + 4a_{10}a_{11}d_3d_6 - 4a_9a_{12}d_3d_6 + 4a_{10}b_7d_3d_6 - 4a_9b_8d_3d_6 - 8a_9c_7d_3d_6 - 4a_9{d_3}^2d_6 - 2a_9a_{10}d_5d_6 + a_7a_{12}d_5d_6 - a_{10}b_5d_5d_6 + a_7b_8d_5d_6 + 2a_7c_7d_5d_6 + 2a_7d_3d_5d_6 - 2a_9a_{12}d_4e_1 - a_{12}b_5d_4e_1 + a_7b_{10}d_4e_1 - 4a_9c_7d_4e_1 - 2b_5c_7d_4e_1 - 4a_9d_3d_4e_1 - 2b_5d_3d_4e_1 + 8a_7d_4d_5e_1 + 2b_3d_4d_5e_1 - 2a_9a_{10}d_6e_1 + a_7a_{12}d_6e_1 - a_{10}b_5d_6e_1 + a_7b_8d_6e_1 + 2a_7c_7d_6e_1 + 2a_7d_3d_6e_1 + 3a_7d_4{e_1}^2 + b_3d_4{e_1}^2 + 4a_9a_{10}d_4e_3 - 5a_7a_{12}d_4e_3 - a_{12}b_3d_4e_3 + 2a_{10}b_5d_4e_3 - 2a_7b_8d_4e_3 - 10a_7c_7d_4e_3 - 2b_3c_7d_4e_3 - 12a_7d_3d_4e_3 - 2b_3d_3d_4e_3 - 3a_7a_{10}d_6e_3 - a_{10}b_3d_6e_3 + 6a_9a_{10}c_7e_4 - 12a_7a_{12}c_7e_4 - 3a_{12}b_3c_7e_4 + 3a_{10}b_5c_7e_4 - 3a_7b_8c_7e_4 - 12a_7{c_7}^2e_4 - 3b_3{c_7}^2e_4 + 6a_9a_{10}d_3e_4 - 12a_7a_{12}d_3e_4 - 3a_{12}b_3d_3e_4 + 3a_{10}b_5d_3e_4 - 3a_7b_8d_3e_4 - 24a_7c_7d_3e_4 - 6b_3c_7d_3e_4 - 8a_7{d_3}^2e_4 - 2b_3{d_3}^2e_4 + 2{a_9}^2d_4e_4 - 7a_7a_{11}d_4e_4 - 2a_{11}b_3d_4e_4 + a_9b_5d_4e_4 - a_7b_7d_4e_4 - 3a_7a_{10}d_5e_4 - a_{10}b_3d_5e_4 + 3a_7a_9d_6e_4 + a_9b_3d_6e_4 - 3a_7a_{10}e_1e_4 - a_{10}b_3e_1e_4 + 3{a_7}^2{e_4}^2 + a_7b_3{e_4}^2 + 6a_7a_{10}d_4f_1 + 2a_{10}b_3d_4f_1 + 9a_7a_{10}c_7f_2 + 3a_{10}b_3c_7f_2 + 9a_7a_{10}d_3f_2 + 3a_{10}b_3d_3f_2 + 3a_7a_9d_4f_2 + a_9b_3d_4f_2 = 0$

$N_8 : 4{a_{12}}^2{c_7}^3 + 4a_{12}b_8{c_7}^3 - 4a_{10}b_{10}{c_7}^3 + 2a_{12}{c_7}^4 + b_8{c_7}^4 + 15{a_{12}}^2{c_7}^2d_3 + 15a_{12}b_8{c_7}^2d_3 - 15a_{10}b_{10}{c_7}^2d_3 + 10a_{12}{c_7}^3d_3 + 5b_8{c_7}^3d_3 + 16{a_{12}}^2c_7{d_3}^2 + 16a_{12}b_8c_7{d_3}^2 - 16a_{10}b_{10}c_7{d_3}^2 + 16a_{12}{c_7}^2{d_3}^2 + 8b_8{c_7}^2{d_3}^2 + 4{a_{12}}^2{d_3}^3 + 4a_{12}b_8{d_3}^3 - 4a_{10}b_{10}{d_3}^3 + 8a_{12}c_7{d_3}^3 + 4b_8c_7{d_3}^3 + 9a_{11}a_{12}{c_7}^2d_4 + 3a_{12}b_7{c_7}^2d_4 + 6a_{11}b_8{c_7}^2d_4 - 6a_{10}b_9{c_7}^2d_4 - 3a_9b_{10}{c_7}^2d_4 + 3a_{11}{c_7}^3d_4 + b_7{c_7}^3d_4 + 28a_{11}a_{12}c_7d_3d_4 + 8a_{12}b_7c_7d_3d_4 + 20a_{11}b_8c_7d_3d_4 - 20a_{10}b_9c_7d_3d_4 - 8a_9b_{10}c_7d_3d_4 + 14a_{11}{c_7}^2d_3d_4 + 4b_7{c_7}^2d_3d_4 + 20a_{11}a_{12}{d_3}^2d_4 + 4a_{12}b_7{d_3}^2d_4 + 16a_{11}b_8{d_3}^2d_4 - 16a_{10}b_9{d_3}^2d_4 - 4a_9b_{10}{d_3}^2d_4 + 20a_{11}c_7{d_3}^2d_4 + 4b_7c_7{d_3}^2d_4 + 8a_{11}{d_3}^3d_4 + 4{a_{11}}^2c_7{d_4}^2 + 4a_{11}b_7c_7{d_4}^2 - 4a_9b_9c_7{d_4}^2 + 8{a_{11}}^2d_3{d_4}^2 + 8a_{11}b_7d_3{d_4}^2 - 8a_9b_9d_3{d_4}^2 + 4a_{10}a_{11}c_7d_4d_5 - 8a_9a_{12}c_7d_4d_5 - 2a_{12}b_5c_7d_4d_5 + 4a_{10}b_7c_7d_4d_5 - 4a_9b_8c_7d_4d_5 + 2a_7b_{10}c_7d_4d_5 - 4a_9c_7{d_4}^2d_5 - b_5c_7{d_4}^2d_5 + 8a_{10}a_{11}d_3d_4d_5 - 12a_9a_{12}d_3d_4d_5 - 2a_{12}b_5d_3d_4d_5 + 8a_{10}b_7d_3d_4d_5 - 8a_9b_8d_3d_4d_5 + 2a_7b_{10}d_3d_4d_5 - 12a_9c_7d_3d_4d_5 - 2b_5c_7d_3d_4d_5 - 8a_9{d_3}^2d_4d_5 - 4a_9a_{11}{d_4}^2d_5 - 2a_{11}b_5{d_4}^2d_5 + 2a_7b_9{d_4}^2d_5 - 4a_9a_{10}d_4{d_5}^2 + 5a_7a_{12}d_4{d_5}^2 + a_{12}b_3d_4{d_5}^2 - 2a_{10}b_5d_4{d_5}^2 + 2a_7b_8d_4{d_5}^2 + 5a_7c_7d_4{d_5}^2 + b_3c_7d_4{d_5}^2 + 4a_7d_3d_4{d_5}^2 + 3a_{10}a_{11}c_7{d_6} - 3a_9a_{12}c_7{d_6} + 3a_{10}b_7c_7{d_6} - 3a_9b_8c_7{d_6} - a_9{c_7}^3{d_6} + 8a_{10}a_{11}c_7d_3{d_6} - 8a_9a_{12}c_7d_3{d_6} + 8a_{10}b_7c_7d_3{d_6} - 8a_9b_8c_7d_3{d_6} - 4a_9c_7{d_3}^2{d_6} + 4a_{10}a_{11}{d_3}^2{d_6} - 4a_9a_{12}{d_3}^2{d_6} + 4a_{10}b_7{d_3}^2{d_6} - 4a_9b_8{d_3}^2{d_6} - 4a_9c_7{d_3}^2{d_6} - 4a_9a_{10}c_7d_5{d_6} + 2a_7a_{12}c_7d_5{d_6} - 2a_{10}b_5c_7d_5{d_6} + 2a_7b_8c_7d_5{d_6} + a_7{c_7}^2d_5{d_6} - 4a_9a_{10}d_3d_5{d_6} + 2a_7a_{12}d_3d_5{d_6} - 2a_{10}b_5d_3d_5{d_6} + 2a_7b_8d_3d_5{d_6} + 2a_7c_7d_3d_5{d_6} + 3a_7a_{10}{d_5}^2{d_6} + a_{10}b_3{d_5}^2{d_6} - 4a_9a_{12}c_7d_4e_1 - 2a_{12}b_5c_7d_4e_1 + 2a_7b_{10}c_7d_4e_1 - 2a_9{c_7}^2d_4e_1 - b_5{c_7}^2d_4e_1 - 4a_9a_{12}d_3d_4e_1 - 2a_{12}b_5d_3d_4e_1 + 2a_7b_{10}d_3d_4e_1 - 4a_9c_7d_3d_4e_1 - 2b_5c_7d_3d_4e_1 - 4a_9a_{11}{d_4}^2e_1 - 2a_{11}b_5{d_4}^2e_1 + 2a_7b_9{d_4}^2e_1 - 4a_9a_{10}d_4d_5e_1 + 8a_7a_{12}d_4d_5e_1 + 2a_{12}b_3d_4d_5e_1 - 2a_{10}b_5d_4d_5e_1 + 2a_7b_8d_4d_5e_1 + 8a_7c_7d_4d_5e_1 + 2b_3c_7d_4d_5e_1 + 4a_7d_3d_4d_5e_1 - 4a_9a_{10}c_7d_6e_1 + 2a_7a_{12}c_7d_6e_1 - 2a_{10}b_5c_7d_6e_1 + 2a_7b_8c_7d_6e_1 + a_7{c_7}^2d_6e_1 - 4a_9a_{10}d_3d_6e_1 + 2a_7a_{12}d_3d_6e_1 - 2a_{10}b_5d_3d_6e_1 + 2a_7b_8d_3d_6e_1 + 2a_7c_7d_3d_6e_1 + 6a_7a_{10}d_5d_6e_1 +$

$$2a_{10}b_3d_5d_6e_1 + 3a_7a_{12}d_4{e_1}^2 + a_{12}b_3d_4{e_1}^2 + 3a_7c_7d_4{e_1}^2 + b_3c_7d_4{e_1}^2 + 3a_7a_{10}d_6{e_1}^2 + a_{10}b_3d_6{e_1}^2 + 8a_9a_{10}c_7d_4e_3 - 10a_7a_{12}c_7d_4e_3 - 2a_{12}b_3c_7d_4e_3 + 4a_{10}b_5c_7d_4e_3 - 4a_7b_8c_7d_4e_3 - 5a_7{c_7}^2d_4e_3 - b_3{c_7}^2d_4e_3 + 12a_9a_{10}d_3d_4e_3 - 12a_7a_{12}d_3d_4e_3 - 2a_{12}b_3d_3d_4e_3 + 6a_{10}b_5d_3d_4e_3 - 6a_7b_8d_3d_4e_3 - 12a_7c_7d_3d_4e_3 - 2b_3c_7d_3d_4e_3 - 4a_7{d_3}^2d_4e_3 + 4a_9{d_4}^2e_3 - 8a_7a_{11}{d_4}^2e_3 - 2a_{11}b_3{d_4}^2e_3 + 2a_9b_5{d_4}^2e_3 - 2a_7b_7{d_4}^2e_3 - 12a_7a_{10}d_4d_5e_3 - 4a_{10}b_3d_4d_5e_3 - 6a_7a_{10}c_7d_6e_3 - 2a_{10}b_3c_7d_6e_3 - 6a_7a_{10}d_3d_6e_3 - 2a_{10}b_3d_3d_6e_3 - 6a_7a_{10}d_4e_1e_3 - 2a_{10}b_3d_4e_1e_3 + 6a_9a_{10}c_7{e_4}^2 - 12a_7a_{12}c_7{e_4}^2 - 3a_{12}b_3c_7{e_4}^2 + 3a_{10}b_5c_7{e_4}^2 - 3a_7b_8c_7{e_4}^2 - 4a_7{c_7}^3e_4 - b_3{c_7}^3e_4 + 12a_9a_{10}c_7d_3e_4 - 24a_7a_{12}c_7d_3e_4 - 6a_{12}b_3c_7d_3e_4 + 6a_{10}b_5c_7d_3e_4 - 6a_7b_8c_7d_3e_4 - 12a_7{c_7}^2d_3e_4 - 3b_3{c_7}^2d_3e_4 + 4a_9a_{10}{d_3}^2e_4 - 8a_7a_{12}{d_3}^2e_4 - 2a_{12}b_3{d_3}^2e_4 + 2a_{10}b_5{d_3}^2e_4 - 2a_7b_8{d_3}^2e_4 - 8a_7c_7{d_3}^2e_4 - 2b_3c_7{d_3}^2e_4 + 4a_9{c_7}^2d_4e_4 - 14a_7a_{11}c_7d_4e_4 - 4a_{11}b_3c_7d_4e_4 + 2a_9b_5c_7d_4e_4 - 2a_7b_7c_7d_4e_4 + 4a_9{d_3}d_4e_4 - 20a_7a_{11}d_3d_4e_4 - 6a_{11}b_3d_3d_4e_4 + 2a_9b_5d_3d_4e_4 - 2a_7b_7d_3d_4e_4 - 6a_7a_{10}c_7d_5e_4 - 2a_{10}b_3c_7d_5e_4 - 3a_7a_{10}d_3d_5e_4 - a_{10}b_3d_3d_5e_4 + 3a_7a_9d_4d_5e_4 + a_9b_3d_4d_5e_4 + 6a_7a_9c_7d_6e_4 + 2a_9b_3c_7d_6e_4 + 6a_7a_9d_3d_6e_4 + 2a_9b_3d_3d_6e_4 - 3{a_7}^2d_5d_6e_4 - a_7b_3d_5d_6e_4 - 6a_7a_{10}c_7e_1e_4 - 2a_{10}b_3c_7e_1e_4 - 3a_7a_{10}d_3e_1e_4 - a_{10}b_3d_3e_1e_4 - 3a_7a_9d_4e_1e_4 - a_9b_3d_4e_1e_4 - 3{a_7}^2d_6e_1e_4 - a_7b_3d_6e_1e_4 + 9{a_7}^2d_4e_3e_4 + 3a_7b_3d_4e_3e_4 + 6{a_7}^2c_7{e_4}^2 + 2a_7b_3c_7{e_4}^2 + 3{a_7}^2d_3{e_4}^2 + a_7b_3d_3{e_4}^2 + 12a_7a_{10}c_7d_4f_1 + 4a_{10}b_3c_7d_4f_1 + 18a_7a_{10}d_3d_4f_1 + 6a_{10}b_3d_3d_4f_1 + 6a_7a_9{d_4}^2f_1 + 2a_9b_3{d_4}^2f_1 + 9a_7a_{10}{c_7}^2f_2 + 3a_{10}b_3{c_7}^2f_2 + 18a_7a_{10}c_7d_3f_2 + 6a_{10}b_3c_7d_3f_2 + 6a_7a_{10}{d_3}^2f_2 + 2a_{10}b_3{d_3}^2f_2 + 6a_7a_9c_7d_4f_2 + 2a_9b_3c_7d_4f_2 + 6a_7a_9d_3d_4f_2 + 2a_9b_3d_3d_4f_2 - 3{a_7}^2d_4d_5f_2 - a_7b_3d_4d_5f_2 - 3{a_7}^2d_4e_1f_2 - a_7b_3d_4e_1f_2 = 0$$

N_9 : $${a_{12}}^2{c_7}^4 + a_{12}b_8{c_7}^4 - a_{10}b_{10}{c_7}^4 + 5{a_{12}}^2{c_7}^3d_3 + 5a_{12}b_8{c_7}^3d_3 - 5a_{10}b_{10}{c_7}^3d_3 + 8{a_{12}}^2{c_7}^2{d_3}^2 + 8a_{12}b_8{c_7}^2{d_3}^2 - 8a_{10}b_{10}{c_7}^2{d_3}^2 + 4{a_{12}}^2c_7{d_3}^3 + 4a_{12}b_8c_7{d_3}^3 - 4a_{10}b_{10}c_7{d_3}^3 + 3a_{11}a_{12}{c_7}^3d_4 + a_{12}b_7{c_7}^3d_4 + 2a_{11}b_8{c_7}^3d_4 - 2a_{10}b_9{c_7}^3d_4 - a_9b_{10}{c_7}^3d_4 + 14a_{11}a_{12}{c_7}^2d_3d_4 + 4a_{12}b_7{c_7}^2d_3d_4 + 10a_{11}b_8{c_7}^2d_3d_4 - 10a_{10}b_9{c_7}^2d_3d_4 - 4a_9b_{10}{c_7}^2d_3d_4 + 20a_{11}a_{12}c_7{d_3}^2d_4 + 4a_{12}b_7c_7{d_3}^2d_4 + 16a_{11}b_8c_7{d_3}^2d_4 - 16a_{10}b_9c_7{d_3}^2d_4 - 4a_9b_{10}c_7{d_3}^2d_4 + 8a_{11}a_{12}{d_3}^3d_4 + 8a_{11}b_8{d_3}^3d_4 - 8a_{10}b_9{d_3}^3d_4 + 2{a_{11}}^2{c_7}^2{d_4}^2 + 2a_{11}b_7{c_7}^2{d_4}^2 - 2a_9b_9{c_7}^2{d_4}^2 + 8{a_{11}}^2c_7d_3{d_4}^2 + 8a_{11}b_7c_7d_3{d_4}^2 - 8a_9b_9c_7d_3{d_4}^2 + 8{a_{11}}^2{d_3}^2{d_4}^2 + 8a_{11}b_7{d_3}^2{d_4}^2 - 8a_9b_9{d_3}^2{d_4}^2 + 2a_{10}a_{11}{c_7}^2d_4d_5 - 4a_9a_{12}{c_7}^2d_4d_5 - a_{12}b_5{c_7}^2d_4d_5 + 2a_{10}b_7{c_7}^2d_4d_5 - 2a_9b_8{c_7}^2d_4d_5 + a_7b_{10}{c_7}^2d_4d_5 + 8a_{10}a_{11}c_7d_3d_4d_5 - 12a_9a_{12}c_7d_3d_4d_5 - 2a_{12}b_5c_7d_3d_4d_5 + 8a_{10}b_7c_7d_3d_4d_5 - 8a_9b_8c_7d_3d_4d_5 + 2a_7b_{10}c_7d_3d_4d_5 + 8a_{10}a_{11}{d_3}^2d_4d_5 - 8a_9a_{12}{d_3}^2d_4d_5 + 8a_{10}b_7{d_3}^2d_4d_5 - 8a_9b_8{d_3}^2d_4d_5 - 4a_9a_{11}c_7{d_4}^2d_5 - 2a_{11}b_5c_7{d_4}^2d_5 + 2a_7b_9c_7{d_4}^2d_5 - 8a_9a_{11}d_3{d_4}^2d_5 - 4a_{11}b_5d_3{d_4}^2d_5 + 4a_7b_9d_3{d_4}^2d_5 - 4a_9a_{10}c_7d_4{d_5}^2 + 5a_7a_{12}c_7d_4{d_5}^2 + a_{12}b_3c_7d_4{d_5}^2 - 2a_{10}b_5c_7d_4{d_5}^2 + 2a_7b_8c_7d_4{d_5}^2 - 8a_9a_{10}d_3d_4{d_5}^2 + 4a_7a_{12}d_3d_4{d_5}^2 - 4a_{10}b_5d_3d_4{d_5}^2 + 4a_7b_8d_3d_4{d_5}^2 + 6a_7a_{11}{d_4}^2{d_5}^2 + 2a_{11}b_3{d_4}^2{d_5}^2 + 6a_7a_{10}d_4{d_5}^3 + 2a_{10}b_3d_4{d_5}^3 + a_{10}a_{11}{c_7}^3d_6 - a_9a_{12}{c_7}^3d_6 + a_{10}b_7{c_7}^3d_6 - a_9b_8{c_7}^3d_6 + 4a_{10}a_{11}{c_7}^2d_3d_6 - 4a_9a_{12}{c_7}^2d_3d_6 + 4a_{10}b_7{c_7}^2d_3d_6 - 4a_9b_8{c_7}^2d_3d_6 + 4a_{10}a_{11}c_7{d_3}^2d_6 - 4a_9a_{12}c_7{d_3}^2d_6 + 4a_{10}b_7c_7{d_3}^2d_6 - 4a_9b_8c_7{d_3}^2d_6 - 2a_9a_{10}{c_7}^2d_5d_6 + a_7a_{12}{c_7}^2d_5d_6 - a_{10}b_5{c_7}^2d_5d_6 + a_7b_8{c_7}^2d_5d_6 - 4a_9a_{10}c_7d_3d_5d_6 + 2a_7a_{12}c_7d_3d_5d_6 - 2a_{10}b_5c_7d_3d_5d_6 + 2a_7b_8c_7d_3d_5d_6 + 3a_7a_{10}c_7{d_5}^2d_6 + a_{10}b_3c_7{d_5}^2d_6 - 2a_9a_{12}{c_7}^2d_4e_1 - a_{12}b_5{c_7}^2d_4e_1 + a_7b_{10}{c_7}^2d_4e_1 - 4a_9a_{12}c_7d_3d_4e_1 - 2a_{12}b_5c_7d_3d_4e_1 + 2a_7b_{10}c_7d_3d_4e_1 - 4a_9a_{11}c_7{d_4}^2e_1 - 2a_{11}b_5c_7{d_4}^2e_1 + 2a_7b_9c_7{d_4}^2e_1 - 8a_9a_{11}d_3{d_4}^2e_1 - 4a_{11}b_5d_3{d_4}^2e_1 + 4a_7b_9d_3{d_4}^2e_1 - 4a_9a_{10}c_7d_4d_5e_1 + 8a_7a_{12}c_7d_4d_5e_1 + 2a_{12}b_3c_7d_4d_5e_1 - 2a_{10}b_5c_7d_4d_5e_1 + 2a_7b_8c_7d_4d_5e_1 - 8a_9a_{10}d_3d_4d_5e_1 + 4a_7a_{12}d_3d_4d_5e_1 - 4a_{10}b_5d_3d_4d_5e_1 + 4a_7b_8d_3d_4d_5e_1 + 12a_7a_{11}{d_4}^2d_5e_1 + 4a_{11}b_3{d_4}^2d_5e_1 + 12a_7a_{10}d_4{d_5}^2e_1 + 4a_{10}b_3d_4{d_5}^2e_1 - 2a_9a_{10}{c_7}^2d_6e_1 + a_7a_{12}{c_7}^2d_6e_1 - a_{10}b_5{c_7}^2d_6e_1 + a_7b_8{c_7}^2d_6e_1 - 4a_9a_{10}c_7d_3d_6e_1 + 2a_7a_{12}c_7d_3d_6e_1 - 2a_{10}b_5c_7d_3d_6e_1 + 2a_7b_8c_7d_3d_6e_1 + 6a_7a_{10}c_7d_5d_6e_1 + 2a_{10}b_3c_7d_5d_6e_1 + 3a_7a_{12}c_7d_4{e_1}^2 + a_{12}b_3c_7d_4{e_1}^2 + 6a_7a_{11}{d_4}^2{e_1}^2 + 2a_{11}b_3{d_4}^2{e_1}^2 + 6a_7a_{10}d_4d_5{e_1}^2 + 2a_{10}b_3d_4d_5{e_1}^2 + 3a_7a_{10}c_7d_6{e_1}^2 + a_{10}b_3c_7d_6{e_1}^2 + 4a_9a_{10}c_7{d_4}^2e_3 - 5a_7a_{12}c_7{d_4}^2e_3 - a_{12}b_3c_7{d_4}^2e_3 + 2a_{10}b_5c_7{d_4}^2e_3 - 2a_7b_8c_7{d_4}^2e_3 + 12a_9a_{10}c_7d_3d_4e_3 - 12a_7a_{12}c_7d_3d_4e_3 - 2a_{12}b_3c_7d_3d_4e_3 + 6a_{10}b_5c_7d_3d_4e_3 - 6a_7b_8c_7d_3d_4e_3 + 8a_9a_{10}{d_3}^2d_4e_3 - 4a_7a_{12}{d_3}^2d_4e_3 + 4a_{10}b_5{d_3}^2d_4e_3 - 4a_7b_8{d_3}^2d_4e_3 + 4a_9{c_7}^2d_4{d_4}^2e_3 - 8a_7a_{11}c_7d_4{d_4}^2e_3 - 2a_{11}b_3c_7d_4{d_4}^2e_3 + 2a_9b_5c_7d_4{d_4}^2e_3 - 2a_7b_7c_7d_4{d_4}^2e_3 + 8a_9{d_3}d_4{d_4}^2e_3 - 16a_7a_{11}d_3d_4{d_4}^2e_3 - 4a_{11}b_3d_3d_4{d_4}^2e_3 + 4a_9b_5d_3d_4{d_4}^2e_3 - 4a_7b_7d_3d_4{d_4}^2e_3 - 12a_7a_{10}c_7d_4d_5e_3 - 4a_{10}b_3c_7d_4d_5e_3 - 18a_7a_{10}d_3d_4d_5e_3 - 6a_{10}b_3d_3d_4d_5e_3 - 6a_7a_9{d_4}^2d_5e_3 - 2a_9b_3{d_4}^2d_5e_3 - 3a_7a_{10}{c_7}^2d_6e_3 - a_{10}b_3{c_7}^2d_6e_3 - 6a_7a_{10}c_7d_3d_6e_3 - 2a_{10}b_3c_7d_3d_6e_3 - 6a_7a_{10}c_7d_4e_1e_3 - 2a_{10}b_3c_7d_4e_1e_3 - 6a_7a_{10}d_3d_4e_1e_3 - 2a_{10}b_3d_3d_4e_1e_3 - 6a_7a_9{d_4}^2e_1e_3 - 2a_9b_3{d_4}^2e_1e_3 + 6{a_7}^2{d_4}^2{e_3}^2 + 2a_7b_3{d_4}^2{e_3}^2 + 2a_9a_{10}{c_7}^3e_4 - 4a_7a_{12}{c_7}^3e_4 - a_{12}b_3{c_7}^3e_4 + a_{10}b_5{c_7}^3e_4 - a_7b_8{c_7}^3e_4 + 6a_9a_{10}{c_7}^2d_3e_4 - 12a_7a_{12}{c_7}^2d_3e_4 - 3a_{12}b_3{c_7}^2d_3e_4 + 3a_{10}b_5{c_7}^2d_3e_4 - 3a_7b_8{c_7}^2d_3e_4 + 4a_9a_{10}c_7{d_3}^2e_4 - 8a_7a_{12}c_7{d_3}^2e_4 - 2a_{12}b_3c_7{d_3}^2e_4 + 2a_{10}b_5c_7{d_3}^2e_4 - 2a_7b_8c_7{d_3}^2e_4 + 2a_9{c_7}^2d_4e_4 - 7a_7a_{11}{c_7}^2d_4e_4 - 2a_{11}b_3{c_7}^2d_4e_4 + a_9b_5{c_7}^2d_4e_4 - a_7b_7{c_7}^2d_4e_4 + 4a_9{c_7}^2d_3d_4e_4 - 20a_7a_{11}c_7d_3d_4e_4 - 6a_{11}b_3c_7d_3d_4e_4 + 2a_9b_5c_7d_3d_4e_4 - 2a_7b_7c_7d_3d_4e_4 - 12a_7a_{11}{d_3}^2d_4e_4 - 4a_{11}b_3{d_3}^2d_4e_4 - 3a_7a_{10}{c_7}^2d_5e_4 - a_{10}b_3{c_7}^2d_5e_4 - 3a_7a_{10}c_7d_3d_5e_4 - a_{10}b_3c_7d_3d_5e_4 + 3a_7a_9c_7d_4d_5e_4 + a_9b_3c_7d_4d_5e_4 + 12a_7a_9d_3d_4d_5e_4 + 4a_9b_3d_3d_4d_5e_4 - 6a_7{d_4}^2{d_5}^2e_4 - 2a_7b_3d_4{d_5}^2e_4 + 3a_7a_9c_7{d_6}^2e_4 + a_9b_3c_7{d_6}^2e_4 + 6a_7a_9c_7d_3d_6e_4 + 2a_9b_3c_7d_3d_6e_4 - 3{a_7}^2c_7d_5d_6e_4 - a_7b_3c_7d_5d_6e_4 - 3a_7a_{10}{c_7}^2e_1e_4 - a_{10}b_3{c_7}^2e_1e_4 - 3a_7a_{10}c_7d_3e_1e_4 - a_{10}b_3c_7d_3e_1e_4 - 3a_7a_9c_7d_4e_1e_4 - a_9b_3c_7d_4e_1e_4 - 6{a_7}^2d_4d_5e_1e_4 - 2a_7b_3d_4d_5e_1e_4 -$$

$$3a_7^2c_7d_6e_1e_4 - a_7b_3c_7d_6e_1e_4 + 9a_7^2c_7d_4e_3e_4 + 3a_7b_3c_7d_4e_3e_4 + 6a_7^2d_3d_4e_3e_4 + 2a_7b_3d_3d_4e_3e_4 + 3a_7^2c_7^2e_4^2 + a_7b_3c_7^2e_4^2 + 3a_7^2c_7d_3e_4^2 + a_7b_3c_7d_3e_4^2 + 6a_7a_{10}c_7^2d_4f_1 + 2a_{10}b_3c_7^2d_4f_1 + 18a_7a_{10}c_7d_3d_4f_1 + 6a_{10}b_3c_7d_3d_4f_1 + 12a_7a_{10}d_3^2d_4f_1 + 4a_{10}b_3d_3^2d_4f_1 + 6a_7a_9c_7d_4^2f_1 + 2a_9b_3c_7d_4^2f_1 + 12a_7a_9d_3d_4^2f_1 + 4a_9b_3d_3d_4^2f_1 - 6a_7^2d_4^2d_5f_1 - 2a_7b_3d_4^2d_5f_1 - 6a_7^2d_4^2e_1f_1 - 2a_7b_3d_4^2e_1f_1 + 3a_7a_{10}c_7^3f_2 + a_{10}b_3c_7^3f_2 + 9a_7a_{10}c_7^2d_3f_2 + 3a_{10}b_3c_7^2d_3f_2 + 6a_7a_{10}c_7d_3^2f_2 + 2a_{10}b_3c_7d_3^2f_2 + 3a_7a_9c_7^2d_4f_2 + a_9b_3c_7^2d_4f_2 + 6a_7a_9c_7d_3d_4f_2 + 2a_9b_3c_7d_3d_4f_2 - 3a_7^2c_7d_4d_5f_2 - a_7b_3c_7d_4d_5f_2 - 3a_7^2c_7d_4e_1f_2 - a_7b_3c_7d_4e_1f_2 = 0$$

Sucesión característica (5, 2, 1)

Etapa 2

Relaciones

R_1: $a_7 = 0$ por $J_1(1)$

R_2: $a_{10} = 0$ por $a_7 = 0$ en $J_{19}(1)$

R_3: $a_1 d_4 = 0$ por $J_{10}(1)$

R_4: $a_1 d_4 = 0$ por $a_7 = 0$ en $J_{12}(1)$

R_5: $b_3 d_4 = 0$ por $a_7 = 0$ en $J_{21}(1)$

R_6: $a_1 d_6 = 0$ por $a_7 = a10 = 0$ en $J_{28}(1)$

R_7: $b_5 d_4 = 0$ por $a_7 = 0$ en $J_{30}(1)$

Ley del Álgebra

$$[X_1, X_3] = X_2$$

$$[X_1, X_5] = X_4$$

$$[X_1, X_6] = X_5$$

$$[X_1, X_7] = X_6$$

$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_4$$

$$[X_2, X_7] = a_9 X_4$$

$$[X_2, X_8] = a_{12} X_2 + a_{11} X_4 + a_9 X_5$$

$$[X_3, X_5] = b_3 X_4$$

$$[X_3, X_6] = b_5 X_4 + b_3 X_5$$

$$[X_3, X_7] = b_8 X_2 + b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$$

$$[X_3, X_8] = b_{10} X_2 + (a_{12} + b_8) X_3 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$$

$$[X_4, X_8] = -2d_4X_2 + c_7X_4$$

$$[X_5, X_7] = d_4X_2 + d_3X_4$$
$$[X_5, X_8] = d_6X_2 - d_4X_3 + d_5X_4 + (c_7 + d_3)\,X_5$$

$$[X_6, X_7] = -(d_6X_2) + d_4X_3 + e_1X_4 + d_3X_5$$
$$[X_6, X_8] = e_4X_2 + e_3X_4 + (d_5 + e_1)\,X_5 + (c_7 + 2d_3)\,X_6$$

$$[X_7, X_8] = f_2X_2 + e_4X_3 + f_1X_4 + e_3X_5 + (d_5 + e_1)\,X_6 + (c_7 + 2d_3)\,X_7$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & b_8 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} + b_8 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -2d_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -d_4 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 + d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 + 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_8 & 0 & -d_4 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & -d_4 & 0 & e_4 \\ 0 & -a_9 & -b_7 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & 0 & -(a_9 + b_5) & 0 & 0 & -d_3 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 + 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 2d_4 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & -(a_{12} + b_8) & 0 & d_4 & 0 & -e_4 & 0 \\ 0 & -a_{11} & -b_9 & -c_7 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11} + b_7) & 0 & -(c_7 + d_3) & -(d_5 + e_1) & -e_3 & 0 \\ 0 & 0 & -2a_9 - b_5 & 0 & 0 & -c_7 - 2d_3 & -(d_5 + e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & -c_7 - 2d_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : a_{12}b_3 + b_3b_8 = 0$

$J_2 : 2a_1a_{12} + a_1b_8 - a_1c_7 = 0$

$J_3 : a_9a_{12} + a_{12}b_5 + b_5b_8 + 3a_9d_3 + 2b_5d_3 = 0$

$J_4 : -(a_{12}d_4) - b_8d_4 + 2c_7d_4 + 5d_3d_4 = 0$

$J_5 : -(b_{10}d_4) + d_4d_5 + a_{12}d_6 - 2c_7d_6 - 5d_3d_6 + 3d_4e_1 = 0$

$J_6 : a_{12}b_5 + b_5b_8 + 2b_5d_3 - a_1e_4 = 0$

$J_7 : a_9a_{12} + 3a_9d_3 + a_1e_4 = 0$

$J_8 : c_7d_3 + 3{d_3}^2 - a_{11}d_4 - b_7d_4 + a_9d_6 - b_3e_4 = 0$

$J_9 : {b_8}^2 + b_8c_7 + 2b_8d_3 + a_{11}d_4 + 3b_7d_4 - 3a_9d_6 - 2b_5d_6 - b_3e_4 = 0$

$J_{10} : -(b_9d_4) + a_{11}d_6 + c_7e_1 + 5d_3e_1 + a_9e_4 - b_5e_4 = 0$

$J_{11} : a_{12}b_7 - a_{11}b_8 + b_7b_8 + a_9b_{10} + a_{11}d_3 + 3b_7d_3 - a_9d_5 + 2a_9e_1 + 2b_5e_1 - a_1f_2 = 0$

Nilpotencia

$N_1 : 2a_{12} + b_8 + 4c_7 + 5d_3 = 0$

$N_2 : {a_{12}}^2 + a_{12}b_8 + 8a_{12}c_7 + 4b_8c_7 + 6{c_7}^2 + 10a_{12}d_3 + 5b_8d_3 + 15c_7d_3 + 8{d_3}^2 + 3a_{11}d_4 + b_7d_4 - a_9d_6 - b_3e_4 = 0$

$N_3 :$ (demasiado grande ...)

$N_4 :$ (demasiado grande ...)

$N_5 :$ (demasiado grande ...)

$N_6 :$ (demasiado grande ...)

Sucesión característica (5, 2, 1)

Etapa 3

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_5] = X_4$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_4$$
$$[X_2, X_7] = a_9 X_4$$
$$[X_2, X_8] = a_{12} X_2 + a_{11} X_4 + a_9 X_5$$

$$[X_3, X_5] = b_3 X_4$$
$$[X_3, X_6] = b_5 X_4 + b_3 X_5$$
$$[X_3, X_7] = (-2a_{12} - 4c_7 - 5d_3) X_2 + b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$$
$$[X_3, X_8] = b_{10} X_2 + (-a_{12} - 4c_7 - 5d_3) X_3 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$$

$$[X_4, X_8] = -2d_4 X_2 + c_7 X_4$$

$$[X_5, X_7] = d_4 X_2 + d_3 X_4$$
$$[X_5, X_8] = d_6 X_2 - d_4 X_3 + d_5 X_4 + (c_7 + d_3) X_5$$

$$[X_6, X_7] = -(d_6 X_2) + d_4 X_3 + e_1 X_4 + d_3 X_5$$
$$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5 + (c_7 + 2d_3) X_6$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6 + (c_7 + 2d_3) X_7$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & -2a_{12} - 4c_7 - 5d_3 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -a_{12} - 4c_7 - 5d_3 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -2d_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -d_4 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7 + d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7+2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2a_{12}+4c_7+5d_3 & 0 & -d_4 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & -d_4 & 0 & e_4 \\ 0 & -a_9 & -b_7 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & 0 & -(a_9+b_5) & 0 & 0 & -d_3 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_7+2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 2d_4 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & a_{12}+4c_7+5d_3 & 0 & d_4 & 0 & -e_4 & 0 \\ 0 & -a_{11} & -b_9 & -c_7 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11}+b_7) & 0 & -(c_7+d_3) & -(d_5+e_1) & -e_3 & 0 \\ 0 & 0 & -2a_9-b_5 & 0 & 0 & -c_7-2d_3 & -(d_5+e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & -c_7-2d_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : -5a_1c_7 - 5a_1d_3 = 0$

$J_2 : -(a_{12}b_3) - 4b_3c_7 - 5b_3d_3 = 0$

$J_3 : a_9a_{12} - a_{12}b_5 - 4b_5c_7 + 3a_9d_3 - 3b_5d_3 = 0$

$J_4 : a_{12}d_4 + 6c_7d_4 + 10d_3d_4 = 0$

$J_5 : -(b_{10}d_4) + d_4d_5 + a_{12}d_6 - 2c_7d_6 - 5d_3d_6 + 3d_4e_1 = 0$

$J_6 : -(a_{12}b_5) - 4b_5c_7 - 3b_5d_3 - a_1e_4 = 0$

$J_7 : a_9a_{12} + 3a_9d_3 + a_1e_4 = 0$

$J_8 : c_7d_3 + 3{d_3}^2 - a_{11}d_4 - b_7d_4 + a_9d_6 - b_3e_4 = 0$

$J_9 : 4{a_{12}}^2 + 14a_{12}c_7 + 12{c_7}^2 + 16a_{12}d_3 + 27c_7d_3 + 15{d_3}^2 + a_{11}d_4 + 3b_7d_4 - 3a_9d_6 - 2b_5d_6 - b_3e_4 = 0$

$J_{10} : -(b_9d_4) + a_{11}d_6 + c_7e_1 + 5d_3e_1 + a_9e_4 - b_5e_4 = 0$

$J_{11} : 2a_{11}a_{12} - a_{12}b_7 + a_9b_{10} + 4a_{11}c_7 - 4b_7c_7 + 6a_{11}d_3 - 2b_7d_3 - a_9d_5 + 2a_9e_1 + 2b_5e_1 - a_1f_2 = 0$

Nilpotencia

N_1 : $-{a_{12}}^2 - 4a_{12}c_7 - 10{c_7}^2 - 5a_{12}d_3 - 25c_7d_3 - 17{d_3}^2 + 3a_{11}d_4 + b_7d_4 - a_9d_6 - b_3e_4 = 0$

N_2 : $-4{a_{12}}^2c_7 - 16a_{12}{c_7}^2 - 20{c_7}^3 - 5{a_{12}}^2d_3 - 40a_{12}c_7d_3 - 75{c_7}^2d_3 - 25a_{12}{d_3}^2 - 91c_7{d_3}^2 - 36{d_3}^3 - a_{11}a_{12}d_4 + a_{12}b_7d_4 + a_{11}c_7d_4 + 3b_7c_7d_4 + 4a_{11}d_3d_4 + 4b_7d_3d_4 + a_9a_{12}d_6 + a_9c_7d_6 + a_9d_3d_6 - a_{12}b_3e_4 - 3b_3c_7e_4 - 3b_3d_3e_4 = 0$

N_3 : (demasiado grande ...)

N_4 : (demasiado grande ...)

N_5 : (demasiado grande ...)

Sucesión característica (5, 2, 1)

Etapa 4A

Relaciones

R_1: $d_4 \neq 0$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

$$\text{Part}(rel, i)$$

Ley del Álgebra

$[X_1, X_3] = X_2$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_3, X_7] = \frac{5d_3X_2}{3} + b_7X_4$

$$[X_3, X_8] = b_{10}X_2 + \tfrac{5d_3X_3}{3} + b_9X_4 + b_7X_5$$

$$[X_4, X_8] = -2d_4X_2 - \tfrac{5d_3X_4}{3}$$

$$[X_5, X_7] = d_4X_2 + d_3X_4$$
$$[X_5, X_8] = d_6X_2 - d_4X_3 + d_5X_4 - \tfrac{2d_3X_5}{3}$$

$$[X_6, X_7] = -(d_6X_2) + d_4X_3 + e_1X_4 + d_3X_5$$
$$[X_6, X_8] = e_4X_2 + e_3X_4 + (d_5 + e_1)X_5 + \tfrac{d_3X_6}{3}$$

$$[X_7, X_8] = f_2X_2 + e_4X_3 + f_1X_4 + e_3X_5 + (d_5 + e_1)X_6 + \tfrac{d_3X_7}{3}$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & \frac{5d_3}{3} & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5d_3}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -2d_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{-5d_3}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -d_4 \\ -1 & 0 & 0 & 0 & 0 & 0 & d_3 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{-2d_3}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & d_3 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{d_3}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{-5d_3}{3} & 0 & -d_4 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & -d_4 & 0 & e_4 \\ 0 & 0 & -b_7 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & -d_3 & 0 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{d_3}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 2d_4 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & \frac{-5d_3}{3} & 0 & d_4 & 0 & -e_4 & 0 \\ 0 & 0 & -b_9 & \frac{5d_3}{3} & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & -b_7 & 0 & \frac{2d_3}{3} & -(d_5 + e_1) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{-d_3}{3} & -(d_5 + e_1) & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & \frac{-d_3}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : \frac{14 b_7 d_3}{3} = 0$

$J_2 : \frac{4 {d_3}^2}{3} - b_7 d_4 = 0$

$J_3 : \frac{10 {d_3}^2}{3} + 3 b_7 d_4 = 0$

$J_4 : -(b_9 d_4) + \frac{10 d_3 e_1}{3} = 0$

$J_5 : -(b_{10} d_4) + d_4 d_5 - \frac{5 d_3 d_5}{3} + 3 d_4 e_1 = 0$

Nilpotencia

$N_1 : \frac{-28 {d_3}^2}{9} + b_7 d_4 = 0$

$N_2 : \frac{-2 {d_3}^3}{27} - b_7 d_3 d_4 = 0$

$N_3 : \frac{25 {d_3}^4}{27} - b_7 {d_3}^2 d_4 = 0$

$N_4 : \frac{50 {d_3}^5}{243} - \frac{5 b_7 {d_3}^3 d_4}{27} = 0$

Sucesión característica (5, 2, 1)

Etapa 4A2

Relaciones

R_1: $d_4 \neq 0$

Ley del Álgebra

$[X_1, X_3] = X_2$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_3, X_8] = (d_5 + 3e_1) X_2$

$[X_4, X_8] = -2d_4 X_2$

$[X_5, X_7] = d_4 X_2$

$[X_5, X_8] = d_6 X_2 - d_4 X_3 + d_5 X_4$

$[X_6, X_7] = -(d_6 X_2) + d_4 X_3 + e_1 X_4$

$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5$

$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 + 3e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -2d_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -d_4 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_4 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -d_4 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & -d_4 & 0 & e_4 \\ 0 & 0 & 0 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -d_5-3e_1 & 2d_4 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & d_4 & 0 & -e_4 & 0 \\ 0 & 0 & 0 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -(d_5+e_1) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(d_5+e_1) & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión Característica de $\mathrm{adj}_{X_1+mX_8}$

S_1^8 : $-3m^3d_4+9m^2d_4d_5-9md_4{d_5}^2+3d_4{d_5}^3+9m^2d_4e_1-18md_4d_5e_1+9d_4{d_5}^2e_1-9md_4{e_1}^2+9d_4d_5{e_1}^2+3d_4{e_1}^3=0$

S_2^8 : $3m^4d_4-9m^3d_4d_5+9m^2d_4{d_5}^2-3md_4{d_5}^3-9m^3d_4e_1+18m^2d_4d_5e_1-9md_4{d_5}^2e_1+9m^2d_4{e_1}^2-9md_4d_5{e_1}^2-3md_4{e_1}^3=0$

S_3^8 : $3m^5{d_4}^2-15m^4{d_4}^2d_5+30m^3{d_4}^2{d_5}^2-30m^2{d_4}^2{d_5}^3+15md_4{}^2{d_5}^4-3{d_4}^2{d_5}^5-15m^4{d_4}^2e_1+60m^3{d_4}^2d_5e_1-90m^2{d_4}^2{d_5}^2e_1+60md_4{}^2{d_5}^3e_1-15{d_4}^2{d_5}^4e_1+30m^3{d_4}^2{e_1}^2-90m^2{d_4}^2d_5{e_1}^2+90md_4{}^2{d_5}^2{e_1}^2-30{d_4}^2{d_5}^3{e_1}^2-30m^2{d_4}^2{e_1}^3+60md_4{}^2d_5{e_1}^3-30{d_4}^2{d_5}^2{e_1}^3+15md_4{}^2{e_1}^4-15{d_4}^2d_5{e_1}^4-3{d_4}^2{e_1}^5=0$

S_4^8 : $3m^6{d_4}^2-15m^5{d_4}^2d_5+30m^4{d_4}^2{d_5}^2-30m^3{d_4}^2{d_5}^3+15m^2{d_4}^2{d_5}^4-3md_4{}^2{d_5}^5-15m^5{d_4}^2e_1+60m^4{d_4}^2d_5e_1-90m^3{d_4}^2{d_5}^2e_1+60m^2{d_4}^2{d_5}^3e_1-15md_4{}^2{d_5}^4e_1+30m^4{d_4}^2{e_1}^2-90m^3{d_4}^2d_5{e_1}^2+90m^2{d_4}^2{d_5}^2{e_1}^2-30md_4{}^2{d_5}^3{e_1}^2-30m^3{d_4}^2{e_1}^3+60m^2{d_4}^2d_5{e_1}^3-30md_4{}^2{d_5}^2{e_1}^3+15m^2{d_4}^2{e_1}^4-15md_4{}^2d_5{e_1}^4-3md_4{}^2{e_1}^5=0$

S_5^8 : (demasiado grande ...)

S_6^8 : (demasiado grande ...)

S_7^8 : (demasiado grande ...)

S_8^8 : (demasiado grande ...)

S_9^8 : (demasiado grande ...)

S_{10}^8 : (demasiado grande ...)

S_{11}^8 : $-3m^4d_4{}^2e_3+12m^3d_4{}^2d_5e_3-18m^2d_4{}^2d_5{}^2e_3+12md_4{}^2d_5{}^3e_3-3d_4{}^2d_5{}^4e_3+12m^3d_4{}^2e_1e_3-36m^2d_4{}^2d_5e_1e_3+36md_4{}^2d_5{}^2e_1e_3-12d_4{}^2d_5{}^3e_1e_3-18m^2d_4{}^2e_1{}^2e_3+36md_4{}^2d_5e_1{}^2e_3-18d_4{}^2d_5{}^2e_1{}^2e_3+12md_4{}^2e_1{}^3e_3-12d_4{}^2d_5e_1{}^3e_3-3d_4{}^2e_1{}^4e_3=0$

S_{12}^8 : $-3m^5d_4{}^2e_3+12m^4d_4{}^2d_5e_3-18m^3d_4{}^2d_5{}^2e_3+12m^2d_4{}^2d_5{}^3e_3-3md_4{}^2d_5{}^4e_3+12m^4d_4{}^2e_1e_3-36m^3d_4{}^2d_5e_1e_3+36m^2d_4{}^2d_5{}^2e_1e_3-12md_4{}^2d_5{}^3e_1e_3-18m^3d_4{}^2e_1{}^2e_3+36m^2d_4{}^2d_5e_1{}^2e_3-18md_4{}^2d_5{}^2e_1{}^2e_3+12m^2d_4{}^2e_1{}^3e_3-12md_4{}^2d_5e_1{}^3e_3-3md_4{}^2e_1{}^4e_3=0$

S_{13}^8 : $3m^5d_4{}^2e_3-15m^4d_4{}^2d_5e_3+30m^3d_4{}^2d_5{}^2e_3-30m^2d_4{}^2d_5{}^3e_3+15md_4{}^2d_5{}^4e_3-3d_4{}^2d_5{}^5e_3-15m^4d_4{}^2e_1e_3+60m^3d_4{}^2d_5e_1e_3-90m^2d_4{}^2d_5{}^2e_1e_3+60md_4{}^2d_5{}^3e_1e_3-15d_4{}^2d_5{}^4e_1e_3+30m^3d_4{}^2e_1{}^2e_3-90m^2d_4{}^2d_5e_1{}^2e_3+90md_4{}^2d_5{}^2e_1{}^2e_3-30d_4{}^2d_5{}^3e_1{}^2e_3-30m^2d_4{}^2e_1{}^3e_3+60md_4{}^2d_5e_1{}^3e_3-30d_4{}^2d_5{}^2e_1{}^3e_3+15md_4{}^2e_1{}^4e_3-15d_4{}^2d_5e_1{}^4e_3-3d_4{}^2e_1{}^5e_3=0$

S_{14}^8 : $-3m^6d_4{}^2e_3+15m^5d_4{}^2d_5e_3-30m^4d_4{}^2d_5{}^2e_3+30m^3d_4{}^2d_5{}^3e_3-15m^2d_4{}^2d_5{}^4e_3+3md_4{}^2d_5{}^5e_3+15m^5d_4{}^2e_1e_3-60m^4d_4{}^2d_5e_1e_3+90m^3d_4{}^2d_5{}^2e_1e_3-60m^2d_4{}^2d_5{}^3e_1e_3+15md_4{}^2d_5{}^4e_1e_3-30m^4d_4{}^2e_1{}^2e_3+90m^3d_4{}^2d_5e_1{}^2e_3-90m^2d_4{}^2d_5{}^2e_1{}^2e_3+30md_4{}^2d_5{}^3e_1{}^2e_3+30m^3d_4{}^2e_1{}^3e_3-60m^2d_4{}^2d_5e_1{}^3e_3+30md_4{}^2d_5{}^2e_1{}^3e_3-15m^2d_4{}^2e_1{}^4e_3+15md_4{}^2d_5e_1{}^4e_3+3md_4{}^2e_1{}^5e_3=0$

S_{15}^8 : (demasiado grande ...)

S_{16}^8 : (demasiado grande ...)

Sucesión característica (5, 2, 1)

Etapa 4B

Ley del Álgebra

$[X_1, X_3] = X_2$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_3] = a_1 X_4$

$[X_2, X_7] = a_9 X_4$

$[X_2, X_8] = a_{12} X_2 + a_{11} X_4 + a_9 X_5$

$[X_3, X_5] = b_3 X_4$

$[X_3, X_6] = b_5 X_4 + b_3 X_5$

$[X_3, X_7] = (-2a_{12} - 5d_3) X_2 + b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$

$[X_3, X_8] = b_{10} X_2 + (-a_{12} - 5d_3) X_3 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$

$[X_5, X_7] = d_3 X_4$

$[X_5, X_8] = d_6 X_2 + d_5 X_4 + d_3 X_5$

$[X_6, X_7] = -(d_6 X_2) + e_1 X_4 + d_3 X_5$

$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5 + 2d_3 X_6$

$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6 + 2d_3 X_7$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & -2a_{12} - 5d_3 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -a_{12} - 5d_3 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2a_{12} + 5d_3 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_4 \\ 0 & -a_9 & -b_7 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & 0 & -(a_9 + b_5) & 0 & 0 & -d_3 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 0 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & a_{12} + 5d_3 & 0 & 0 & 0 & -e_4 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11} + b_7) & 0 & -d_3 & -(d_5 + e_1) & -e_3 & 0 \\ 0 & 0 & -2a_9 - b_5 & 0 & 0 & -2d_3 & -(d_5 + e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & -2d_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : -(a_{12}b_3) - 5b_3d_3 = 0$

$J_2 : a_9a_{12} - a_{12}b_5 + 3a_9d_3 - 3b_5d_3 = 0$

$J_3 : a_{12}d_6 - 5d_3d_6 = 0$

$J_4 : -(a_{12}b_5) - 3b_5d_3 - a_1e_4 = 0$

$J_5 : a_9a_{12} + 3a_9d_3 + a_1e_4 = 0$

$J_6 : 3{d_3}^2 + a_9d_6 - b_3e_4 = 0$

$J_7 : 4{a_{12}}^2 + 16a_{12}d_3 + 15{d_3}^2 - 3a_9d_6 - 2b_5d_6 - b_3e_4 = 0$

$J_8 : a_{11}d_6 + 5d_3e_1 + a_9e_4 - b_5e_4 = 0$

$J_9 : 2a_{11}a_{12} - a_{12}b_7 + a_9b_{10} + 6a_{11}d_3 - 2b_7d_3 - a_9d_5 + 2a_9e_1 + 2b_5e_1 - a_1f_2 = 0$

Nilpotencia

$N_1 : -{a_{12}}^2 - 5a_{12}d_3 - 17{d_3}^2 - a_9d_6 - b_3e_4 = 0$

$N_2 : -5{a_{12}}^2d_3 - 25a_{12}{d_3}^2 - 36{d_3}^3 + a_9a_{12}d_6 + a_9d_3d_6 - a_{12}b_3e_4 - 3b_3d_3e_4 = 0$

$N_3 : -8{a_{12}}^2{d_3}^2 - 40a_{12}{d_3}^3 - 20{d_3}^4 + 4a_9a_{12}d_3d_6 + 16a_9{d_3}^2d_6 - 3a_{12}b_3d_3e_4 - 2b_3{d_3}^2e_4 + a_9b_3d_6e_4 = 0$

$N_4 : -4{a_{12}}^2{d_3}^3 - 20a_{12}{d_3}^4 + 4a_9a_{12}{d_3}^2d_6 + 20a_9{d_3}^3d_6 - 2a_{12}b_3{d_3}^2e_4 + 2a_9b_3d_3d_6e_4 = 0$

Sucesión característica (5, 2, 1)

Etapa 4BA

Ley del Álgebra

$[X_1, X_3] = X_2 + MX_8$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_2, X_3] = a_1 X_4$

$[X_2, X_7] = a_9 X_4$

$[X_2, X_8] = a_{11} X_4 + a_9 X_5$

$[X_3, X_5] = b_3 X_4$

$[X_3, X_6] = b_5 X_4 + b_3 X_5$

$[X_3, X_7] = b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$

$[X_3, X_8] = b_{10} X_2 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$

$[X_5, X_8] = d_5 X_4$

$[X_6, X_7] = e_1 X_4$

$[X_6, X_8] = e_3 X_4 + (d_5 + e_1) X_5$

$[X_7, X_8] = f_2 X_2 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & M & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ -M & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_9 & -b_7 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & -(a_9+b_5) & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & 0 & 0 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11}+b_7) & 0 & 0 & -(d_5+e_1) & -e_3 & 0 \\ 0 & 0 & -2a_9-b_5 & 0 & 0 & 0 & -(d_5+e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : -(Ma_9) = 0$

$J_2 : -(Ma_{11}) = 0$

$J_3 : Md_5 = 0$

$J_4 : Md_5 + Me_1 = 0$

$J_5 : Me_3 = 0$

$J_6 : Mf_1 = 0$

$J_7 : Mf_2 = 0$

$J_8 : a_9b_{10} - a_9d_5 + 2a_9e_1 + 2b_5e_1 - a_1f_2 = 0$

Sucesión característica (5, 2, 1)

Etapa 4BB

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_5] = X_4$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_7] = a_9 X_4$$
$$[X_2, X_8] = a_{12} X_2 + a_{11} X_4 + a_9 X_5$$

$$[X_3, X_5] = b_3 X_4$$
$$[X_3, X_6] = b_5 X_4 + b_3 X_5$$
$$[X_3, X_7] = (-2a_{12} - 5d_3) X_2 + b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$$
$$[X_3, X_8] = b_{10} X_2 + (-a_{12} - 5d_3) X_3 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$$

$$[X_5, X_7] = d_3 X_4$$
$$[X_5, X_8] = d_6 X_2 + d_5 X_4 + d_3 X_5$$

$$[X_6, X_7] = -(d_6 X_2) + e_1 X_4 + d_3 X_5$$
$$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5 + 2d_3 X_6$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6 + 2d_3 X_7$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & -2a_{12} - 5d_3 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -a_{12} - 5d_3 \\ 0 & 0 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & d_3 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2a_{12} + 5d_3 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_4 \\ 0 & -a_9 & -b_7 & 0 & -d_3 & -e_1 & 0 & f_1 \\ 0 & 0 & -(a_9 + b_5) & 0 & 0 & -d_3 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2d_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & 0 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & a_{12} + 5d_3 & 0 & 0 & 0 & -e_4 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11} + b_7) & 0 & -d_3 & -(d_5 + e_1) & -e_3 & 0 \\ 0 & 0 & -2a_9 - b_5 & 0 & 0 & -2d_3 & -(d_5 + e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & -2d_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$J_1 : a_9a_{12} + 3a_9d_3 = 0$

$J_2 : -(a_{12}b_3) - 5b_3d_3 = 0$

$J_3 : -(a_{12}b_5) - 3b_5d_3 = 0$

$J_4 : a_9a_{12} - a_{12}b_5 + 3a_9d_3 - 3b_5d_3 = 0$

$J_5 : a_{12}d_6 - 5d_3d_6 = 0$

$J_6 : 2a_{11}a_{12} - a_{12}b_7 + a_9b_{10} + 6a_{11}d_3 - 2b_7d_3 - a_9d_5 + 2a_9e_1 + 2b_5e_1 = 0$

$J_7 : 3{d_3}^2 + a_9d_6 - b_3e_4 = 0$

$J_8 : 4{a_{12}}^2 + 16a_{12}d_3 + 15{d_3}^2 - 3a_9d_6 - 2b_5d_6 - b_3e_4 = 0$

$J_9 : a_{11}d_6 + 5d_3e_1 + a_9e_4 - b_5e_4 = 0$

Nilpotencia

$N_1 : -a_{12}{}^2 - 5a_{12}d_3 - 17d_3{}^2 - a_9d_6 - b_3e_4 = 0$

$N_2 : -5a_{12}{}^2d_3 - 25a_{12}d_3{}^2 - 36d_3{}^3 + a_9a_{12}d_6 + a_9d_3d_6 - a_{12}b_3e_4 - 3b_3d_3e_4 = 0$

$N_3 : -8a_{12}{}^2d_3{}^2 - 40a_{12}d_3{}^3 - 20d_3{}^4 + 4a_9a_{12}d_3d_6 + 16a_9d_3{}^2d_6 - 3a_{12}b_3d_3e_4 - 2b_3d_3{}^2e_4 + a_9b_3d_6e_4 = 0$

$N_4 : -4a_{12}{}^2d_3{}^3 - 20a_{12}d_3{}^4 + 4a_9a_{12}d_3{}^2d_6 + 20a_9d_3{}^3d_6 - 2a_{12}b_3d_3{}^2e_4 + 2a_9b_3d_3d_6e_4 = 0$

Sucesión característica (5, 2, 1)

Etapa 4BB1

Ley del Álgebra

$$[X_1, X_3] = X_2$$

$$[X_1, X_5] = X_4$$

$$[X_1, X_6] = X_5$$

$$[X_1, X_7] = X_6$$

$$[X_1, X_8] = X_7$$

$$[X_3, X_5] = b_3 X_4$$

$$[X_3, X_6] = b_3 X_5$$

$$[X_3, X_7] = b_7 X_4 + b_3 X_6$$

$$[X_3, X_8] = b_{10} X_2 + b_9 X_4 + b_7 X_5 + b_3 X_7$$

$$[X_5, X_8] = d_6 X_2 + d_5 X_4$$

$$[X_6, X_7] = -(d_6 X_2) + e_1 X_4$$

$$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & b_3 & 0 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & 0 & b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_4 \\ 0 & 0 & -b_7 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -e_4 & 0 \\ 0 & 0 & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & -b_7 & 0 & 0 & -(d_5+e_1) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(d_5+e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$\mathrm{J}_1 : -(b_3 e_4) = 0$

Nilpotencia

$\mathrm{N}_1 : -(b_3 e_4) = 0$

Sucesión Característica de $\mathrm{adj}_{X_1+mX_8}$

$\mathrm{S}_1^8 : m^4 {b_3}^2 {e_4}^2 = 0$

$\mathrm{S}_2^8 : -\left(m^5 {b_3}^2 {e_4}^2\right) = 0$

$\mathrm{S}_3^8 : -\left(m^5 {b_3}^3 {e_4}^2\right) = 0$

$\mathrm{S}_4^8 : -\left(m^5 {b_3}^2 e_3 {e_4}^2\right) = 0$

$\mathrm{S}_5^8 : -\left(m^5 {b_3}^2 {e_4}^3\right) = 0$

$\mathrm{S}_6^8 : m^7 {b_3}^3 e_3 {e_4}^3 = 0$

$S_7^8 : m^8 {b_3}^3 e_3 {e_4}^3 = 0$

$S_8^8 : m^8 {b_3}^4 e_3 {e_4}^3 = 0$

$S_9^8 : m^7 {b_3}^3 {e_4}^4 = 0$

$S_{10}^8 : m^8 {b_3}^3 {e_4}^4 = 0$

$S_{11}^8 : m^8 {b_3}^4 {e_4}^4 = 0$

$S_{12}^8 : m^2 b_3 e_4 - 2m^3 b_3 d_5 e_4 + m^4 b_3 {d_5}^2 e_4 - 2m^3 b_3 e_1 e_4 + 2m^4 b_3 d_5 e_1 e_4 + m^4 b_3 {e_1}^2 e_4 + m^4 b_3 b_7 {e_4}^2 = 0$

$S_{13}^8 : -\left(m^3 b_3 e_4\right) + 2m^4 b_3 d_5 e_4 - m^5 b_3 {d_5}^2 e_4 + 2m^4 b_3 e_1 e_4 - 2m^5 b_3 d_5 e_1 e_4 - m^5 b_3 {e_1}^2 e_4 - m^5 b_3 b_7 {e_4}^2 = 0$

$S_{14}^8 : -\left(m^3 {b_3}^2 e_4\right) + 2m^4 {b_3}^2 d_5 e_4 - m^5 {b_3}^2 {d_5}^2 e_4 + 2m^4 {b_3}^2 e_1 e_4 - 2m^5 {b_3}^2 d_5 e_1 e_4 - m^5 {b_3}^2 {e_1}^2 e_4 - m^5 {b_3}^2 b_7 {e_4}^2 = 0$

$S_{15}^8 : -2m^3 b_3 e_3 e_4 + 2m^4 b_3 d_5 e_3 e_4 + m^4 b_3 e_1 e_3 e_4 + m^4 b_3 b_9 {e_4}^2 = 0$

$S_{16}^8 : 2m^4 b_3 e_3 e_4 - 2m^5 b_3 d_5 e_3 e_4 - m^5 b_3 e_1 e_3 e_4 - m^5 b_3 b_9 {e_4}^2 = 0$

$S_{17}^8 : 2m^4 {b_3}^2 e_3 e_4 - 2m^5 {b_3}^2 d_5 e_3 e_4 - m^5 {b_3}^2 e_1 e_3 e_4 - m^5 {b_3}^2 b_9 {e_4}^2 = 0$

$S_{18}^8 : m^4 b_3 d_6 e_3 e_4 - 2m^3 b_3 {e_4}^2 + m^4 b_3 b_{10} {e_4}^2 + m^4 b_3 d_5 {e_4}^2 + m^4 b_3 e_1 {e_4}^2 = 0$

$S_{19}^8 : -\left(m^5 b_3 d_6 e_3 e_4\right) + 2m^4 b_3 {e_4}^2 - m^5 b_3 b_{10} {e_4}^2 - m^5 b_3 d_5 {e_4}^2 - m^5 b_3 e_1 {e_4}^2 = 0$

$S_{20}^8 : m^4 {b_3}^2 {e_4}^2 - m^5 {b_3}^2 d_5 {e_4}^2 - m^5 {b_3}^2 e_1 {e_4}^2 = 0$

$S_{21}^8 : -\left(m^5 {b_3}^2 d_6 e_3 e_4\right) + 2m^4 {b_3}^2 {e_4}^2 - m^5 {b_3}^2 b_{10} {e_4}^2 - m^5 {b_3}^2 d_5 {e_4}^2 - m^5 {b_3}^2 e_1 {e_4}^2 = 0$

$S_{22}^8 : -\left(m^6 {b_3}^3 {e_4}^3\right) + m^7 {b_3}^3 d_5 {e_4}^3 + m^7 {b_3}^3 e_1 {e_4}^3 = 0$

$S_{23}^8 : -\left(m^7 {b_3}^3 {e_4}^3\right) + m^8 {b_3}^3 d_5 {e_4}^3 + m^8 {b_3}^3 e_1 {e_4}^3 = 0$

$S_{24}^8 : -\left(m^7 {b_3}^4 {e_4}^3\right) + m^8 {b_3}^4 d_5 {e_4}^3 + m^8 {b_3}^4 e_1 {e_4}^3 = 0$

$S_{25}^8 : m^4 {b_3}^2 {e_4}^2 - 3m^5 {b_3}^2 d_5 {e_4}^2 + 3m^6 {b_3}^2 {d_5}^2 {e_4}^2 - m^7 {b_3}^2 {d_5}^3 {e_4}^2 - 3m^5 {b_3}^2 e_1 {e_4}^2 + 6m^6 {b_3}^2 d_5 e_1 {e_4}^2 - 3m^7 {b_3}^2 {d_5}^2 e_1 {e_4}^2 + 3m^6 {b_3}^2 {e_1}^2 {e_4}^2 - 3m^7 {b_3}^2 d_5 {e_1}^2 {e_4}^2 - m^7 {b_3}^2 {e_1}^3 {e_4}^2 + m^6 {b_3}^2 b_7 {e_4}^3 - m^7 {b_3}^2 b_7 d_5 {e_4}^3 - m^7 {b_3}^2 b_7 e_1 {e_4}^3 = 0$

$S_{26}^8 : m^5 {b_3}^2 {e_4}^2 - 3m^6 {b_3}^2 d_5 {e_4}^2 + 3m^7 {b_3}^2 {d_5}^2 {e_4}^2 - m^8 {b_3}^2 {d_5}^3 {e_4}^2 - 3m^6 {b_3}^2 e_1 {e_4}^2 + 6m^7 {b_3}^2 d_5 e_1 {e_4}^2 - 3m^8 {b_3}^2 {d_5}^2 e_1 {e_4}^2 + 3m^7 {b_3}^2 {e_1}^2 {e_4}^2 - 3m^8 {b_3}^2 d_5 {e_1}^2 {e_4}^2 - m^8 {b_3}^2 {e_1}^3 {e_4}^2 + m^7 {b_3}^2 b_7 {e_4}^3 - m^8 {b_3}^2 b_7 d_5 {e_4}^3 - m^8 {b_3}^2 b_7 e_1 {e_4}^3 = 0$

$S_{27}^8 : m^5 {b_3}^3 {e_4}^2 - 3m^6 {b_3}^3 d_5 {e_4}^2 + 3m^7 {b_3}^3 {d_5}^2 {e_4}^2 - m^8 {b_3}^3 {d_5}^3 {e_4}^2 - 3m^6 {b_3}^3 e_1 {e_4}^2 + 6m^7 {b_3}^3 d_5 e_1 {e_4}^2 - 3m^8 {b_3}^3 {d_5}^2 e_1 {e_4}^2 + 3m^7 {b_3}^3 {e_1}^2 {e_4}^2 - 3m^8 {b_3}^3 d_5 {e_1}^2 {e_4}^2 - m^8 {b_3}^3 {e_1}^3 {e_4}^2 + m^7 {b_3}^3 b_7 {e_4}^3 - m^8 {b_3}^3 b_7 d_5 {e_4}^3 - m^8 {b_3}^3 b_7 e_1 {e_4}^3 = 0$

$S_{28}^8 : -2m^5 {b_3}^2 e_3 {e_4}^2 + 4m^6 {b_3}^2 d_5 e_3 {e_4}^2 - 2m^7 {b_3}^2 {d_5}^2 e_3 {e_4}^2 + 3m^6 {b_3}^2 e_1 e_3 {e_4}^2 - 3m^7 {b_3}^2 d_5 e_1 e_3 {e_4}^2 - m^7 {b_3}^2 {e_1}^2 e_3 {e_4}^2 + m^6 {b_3}^2 b_9 {e_4}^3 - m^7 {b_3}^2 b_9 d_5 {e_4}^3 - m^7 {b_3}^2 b_9 e_1 {e_4}^3 = 0$

$S_{29}^8 : -2m^6 {b_3}^2 e_3 {e_4}^2 + 4m^7 {b_3}^2 d_5 e_3 {e_4}^2 - 2m^8 {b_3}^2 {d_5}^2 e_3 {e_4}^2 + 3m^7 {b_3}^2 e_1 e_3 {e_4}^2 - 3m^8 {b_3}^2 d_5 e_1 e_3 {e_4}^2 - m^8 {b_3}^2 {e_1}^2 e_3 {e_4}^2 + m^7 {b_3}^2 b_9 {e_4}^3 - m^8 {b_3}^2 b_9 d_5 {e_4}^3 - m^8 {b_3}^2 b_9 e_1 {e_4}^3 = 0$

$S_{30}^8 : -2m^6 {b_3}^3 e_3 {e_4}^2 + 4m^7 {b_3}^3 d_5 e_3 {e_4}^2 - 2m^8 {b_3}^3 {d_5}^2 e_3 {e_4}^2 + 3m^7 {b_3}^3 e_1 e_3 {e_4}^2 - 3m^8 {b_3}^3 d_5 e_1 e_3 {e_4}^2 - m^8 {b_3}^3 {e_1}^2 e_3 {e_4}^2 + m^7 {b_3}^3 b_9 {e_4}^3 - m^8 {b_3}^3 b_9 d_5 {e_4}^3 - m^8 {b_3}^3 b_9 e_1 {e_4}^3 = 0$

$S_{31}^8 : m^6 {b_3}^2 d_6 e_3 {e_4}^2 - m^7 {b_3}^2 d_5 d_6 e_3 {e_4}^2 - m^7 {b_3}^2 d_6 e_1 e_3 {e_4}^2 - 2m^5 {b_3}^2 {e_4}^3 + m^6 {b_3}^2 b_{10} {e_4}^3 + 3m^6 {b_3}^2 d_5 {e_4}^3 - m^7 {b_3}^2 b_{10} d_5 {e_4}^3 - m^7 {b_3}^2 {d_5}^2 {e_4}^3 + 3m^6 {b_3}^2 e_1 {e_4}^3 - m^7 {b_3}^2 b_{10} e_1 {e_4}^3 - 2m^7 {b_3}^2 d_5 e_1 {e_4}^3 - m^7 {b_3}^2 {e_1}^2 {e_4}^3 = 0$

$S_{32}^8 : m^7 {b_3}^2 d_6 e_3 {e_4}^2 - m^8 {b_3}^2 d_5 d_6 e_3 {e_4}^2 - m^8 {b_3}^2 d_6 e_1 e_3 {e_4}^2 - 2m^6 {b_3}^2 {e_4}^3 + m^7 {b_3}^2 b_{10} {e_4}^3 + 3m^7 {b_3}^2 d_5 {e_4}^3 - m^8 {b_3}^2 b_{10} d_5 {e_4}^3 - m^8 {b_3}^2 {d_5}^2 {e_4}^3 + 3m^7 {b_3}^2 e_1 {e_4}^3 - m^8 {b_3}^2 b_{10} e_1 {e_4}^3 - 2m^8 {b_3}^2 d_5 e_1 {e_4}^3 - m^8 {b_3}^2 {e_1}^2 {e_4}^3 = 0$

$S_{33}^8 : m^7 {b_3}^3 d_6 e_3 {e_4}^2 - m^8 {b_3}^3 d_5 d_6 e_3 {e_4}^2 - m^8 {b_3}^3 d_6 e_1 e_3 {e_4}^2 - 2m^6 {b_3}^3 {e_4}^3 + m^7 {b_3}^3 b_{10} {e_4}^3 + 3m^7 {b_3}^3 d_5 {e_4}^3 - m^8 {b_3}^3 b_{10} d_5 {e_4}^3 - m^8 {b_3}^3 {d_5}^2 {e_4}^3 + 3m^7 {b_3}^3 e_1 {e_4}^3 - m^8 {b_3}^3 b_{10} e_1 {e_4}^3 - 2m^8 {b_3}^3 d_5 e_1 {e_4}^3 - m^8 {b_3}^3 {e_1}^2 {e_4}^3 = 0$

S_{34}^{8} : $m^5 {b_3}^2 {e_4}^3 - 2m^6 {b_3}^2 d_5 {e_4}^3 + m^7 {b_3}^2 {d_5}^2 {e_4}^3 - 2m^6 {b_3}^2 e_1 {e_4}^3 + 2m^7 {b_3}^2 d_5 e_1 {e_4}^3 + m^7 {b_3}^2 {e_1}^2 {e_4}^3 + m^7 {b_3}^2 b_7 {e_4}^4 = 0$

S_{35}^{8} : $m^6 {b_3}^2 {e_4}^3 - 2m^7 {b_3}^2 d_5 {e_4}^3 + m^8 {b_3}^2 {d_5}^2 {e_4}^3 - 2m^7 {b_3}^2 e_1 {e_4}^3 + 2m^8 {b_3}^2 d_5 e_1 {e_4}^3 + m^8 {b_3}^2 {e_1}^2 {e_4}^3 + m^8 {b_3}^2 b_7 {e_4}^4 = 0$

S_{36}^{8} : $m^6 {b_3}^3 {e_4}^3 - 2m^7 {b_3}^3 d_5 {e_4}^3 + m^8 {b_3}^3 {d_5}^2 {e_4}^3 - 2m^7 {b_3}^3 e_1 {e_4}^3 + 2m^8 {b_3}^3 d_5 e_1 {e_4}^3 + m^8 {b_3}^3 {e_1}^2 {e_4}^3 + m^8 {b_3}^3 b_7 {e_4}^4 = 0$

S_{37}^{8} : $-2m^6 {b_3}^2 e_3 {e_4}^3 + 2m^7 {b_3}^2 d_5 e_3 {e_4}^3 + m^7 {b_3}^2 e_1 e_3 {e_4}^3 + m^7 {b_3}^2 b_9 {e_4}^4 = 0$

S_{38}^{8} : $-2m^7 {b_3}^2 e_3 {e_4}^3 + 2m^8 {b_3}^2 d_5 e_3 {e_4}^3 + m^8 {b_3}^2 e_1 e_3 {e_4}^3 + m^8 {b_3}^2 b_9 {e_4}^4 = 0$

S_{39}^{8} : $-2m^7 {b_3}^3 e_3 {e_4}^3 + 2m^8 {b_3}^3 d_5 e_3 {e_4}^3 + m^8 {b_3}^3 e_1 e_3 {e_4}^3 + m^8 {b_3}^3 b_9 {e_4}^4 = 0$

S_{40}^{8} : $-\left(m^7 {b_3}^2 d_6 e_3 {e_4}^3\right) + 2m^6 {b_3}^2 {e_4}^4 - m^7 {b_3}^2 b_{10} {e_4}^4 - m^7 {b_3}^2 d_5 {e_4}^4 - m^7 {b_3}^2 e_1 {e_4}^4 = 0$

S_{41}^{8} : $-\left(m^8 {b_3}^2 d_6 e_3 {e_4}^3\right) + 2m^7 {b_3}^2 {e_4}^4 - m^8 {b_3}^2 b_{10} {e_4}^4 - m^8 {b_3}^2 d_5 {e_4}^4 - m^8 {b_3}^2 e_1 {e_4}^4 = 0$

S_{42}^{8} : $-\left(m^8 {b_3}^3 d_6 e_3 {e_4}^3\right) + 2m^7 {b_3}^3 {e_4}^4 - m^8 {b_3}^3 b_{10} {e_4}^4 - m^8 {b_3}^3 d_5 {e_4}^4 - m^8 {b_3}^3 e_1 {e_4}^4 = 0$

S_{43}^{8} : $m^2 b_3 e_4 - 3m^3 b_3 d_5 e_4 + 3m^4 b_3 {d_5}^2 e_4 - m^5 b_3 {d_5}^3 e_4 - 2m^3 b_3 e_1 e_4 + 4m^4 b_3 d_5 e_1 e_4 - 2m^5 b_3 {d_5}^2 e_1 e_4 + m^4 b_3 {e_1}^2 e_4 - m^5 b_3 d_5 {e_1}^2 e_4 + m^4 b_3 b_7 {e_4}^2 - m^5 b_3 b_7 d_5 {e_4}^2 - m^5 {b_3}^2 {e_4}^2 f_1 = 0$

S_{44}^{8} : $-\left(m^4 {b_3}^2 {e_4}^2\right) + 3m^5 {b_3}^2 d_5 {e_4}^2 - 3m^6 {b_3}^2 {d_5}^2 {e_4}^2 + m^7 {b_3}^2 {d_5}^3 {e_4}^2 + 2m^5 {b_3}^2 e_1 {e_4}^2 - 4m^6 {b_3}^2 d_5 e_1 {e_4}^2 + 2m^7 {b_3}^2 {d_5}^2 e_1 {e_4}^2 - m^6 {b_3}^2 {e_1}^2 {e_4}^2 + m^7 {b_3}^2 d_5 {e_1}^2 {e_4}^2 - m^6 {b_3}^2 b_7 {e_4}^3 + m^7 {b_3}^2 b_7 d_5 {e_4}^3 + m^7 {b_3}^3 {e_4}^3 f_1 = 0$

S_{45}^{8} : $-\left(m^5 {b_3}^2 {e_4}^2\right) + 3m^6 {b_3}^2 d_5 {e_4}^2 - 3m^7 {b_3}^2 {d_5}^2 {e_4}^2 + m^8 {b_3}^2 {d_5}^3 {e_4}^2 + 2m^6 {b_3}^2 e_1 {e_4}^2 - 4m^7 {b_3}^2 d_5 e_1 {e_4}^2 + 2m^8 {b_3}^2 {d_5}^2 e_1 {e_4}^2 - m^7 {b_3}^2 {e_1}^2 {e_4}^2 + m^8 {b_3}^2 d_5 {e_1}^2 {e_4}^2 - m^7 {b_3}^2 b_7 {e_4}^3 + m^8 {b_3}^2 b_7 d_5 {e_4}^3 + m^8 {b_3}^3 {e_4}^3 f_1 = 0$

S_{46}^{8} : $-\left(m^5 {b_3}^3 {e_4}^2\right) + 3m^6 {b_3}^3 d_5 {e_4}^2 - 3m^7 {b_3}^3 {d_5}^2 {e_4}^2 + m^8 {b_3}^3 {d_5}^3 {e_4}^2 + 2m^6 {b_3}^3 e_1 {e_4}^2 - 4m^7 {b_3}^3 d_5 e_1 {e_4}^2 + 2m^8 {b_3}^3 {d_5}^2 e_1 {e_4}^2 - m^7 {b_3}^3 {e_1}^2 {e_4}^2 + m^8 {b_3}^3 d_5 {e_1}^2 {e_4}^2 - m^7 {b_3}^3 b_7 {e_4}^3 + m^8 {b_3}^3 b_7 d_5 {e_4}^3 + m^8 {b_3}^4 {e_4}^3 f_1 = 0$

S_{47}^{8} : (demasiado grande ...)

S_{48}^{8} : (demasiado grande ...)

S_{49}^{8} : (demasiado grande ...)

S_{50}^{8} : $-\left(m^3 b_3 d_6 e_4\right) + 2m^4 b_3 d_5 d_6 e_4 - m^5 b_3 {d_5}^2 d_6 e_4 + 2m^4 b_3 d_6 e_1 e_4 - 2m^5 b_3 d_5 d_6 e_1 e_4 - m^5 b_3 d_6 {e_1}^2 e_4 - m^5 b_3 b_7 d_6 {e_4}^2 - m^5 {b_3}^2 {e_4}^2 f_2 = 0$

S_{51}^{8} : $m^5 {b_3}^2 d_6 {e_4}^2 - 2m^6 {b_3}^2 d_5 d_6 {e_4}^2 + m^7 {b_3}^2 {d_5}^2 d_6 {e_4}^2 - 2m^6 {b_3}^2 d_6 e_1 {e_4}^2 + 2m^7 {b_3}^2 d_5 d_6 e_1 {e_4}^2 + m^7 {b_3}^2 d_6 {e_1}^2 {e_4}^2 + m^7 {b_3}^2 b_7 d_6 {e_4}^3 + m^7 {b_3}^3 {e_4}^3 f_2 = 0$

S_{52}^{8} : $m^6 {b_3}^2 d_6 {e_4}^2 - 2m^7 {b_3}^2 d_5 d_6 {e_4}^2 + m^8 {b_3}^2 {d_5}^2 d_6 {e_4}^2 - 2m^7 {b_3}^2 d_6 e_1 {e_4}^2 + 2m^8 {b_3}^2 d_5 d_6 e_1 {e_4}^2 + m^8 {b_3}^2 d_6 {e_1}^2 {e_4}^2 + m^8 {b_3}^2 b_7 d_6 {e_4}^3 + m^8 {b_3}^3 {e_4}^3 f_2 = 0$

S_{53}^{8} : $m^6 {b_3}^3 d_6 {e_4}^2 - 2m^7 {b_3}^3 d_5 d_6 {e_4}^2 + m^8 {b_3}^3 {d_5}^2 d_6 {e_4}^2 - 2m^7 {b_3}^3 d_6 e_1 {e_4}^2 + 2m^8 {b_3}^3 d_5 d_6 e_1 {e_4}^2 + m^8 {b_3}^3 d_6 {e_1}^2 {e_4}^2 + m^8 {b_3}^3 b_7 d_6 {e_4}^3 + m^8 {b_3}^4 {e_4}^3 f_2 = 0$

S_{54}^{8} : (demasiado grande ...)

S_{55}^{8} : (demasiado grande ...)

S_{56}^{8} : (demasiado grande ...)

S_{57}^{8} : (demasiado grande ...)

S_{58}^{8} : (demasiado grande ...)

S_{59}^{8} : (demasiado grande ...)

Sucesión característica (5, 2, 1)

Etapa 4BB1B

Relaciones

R_1: $b_3 \neq 0$

Ley del Álgebra

$[X_1, X_3] = X_2$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_3, X_5] = b_3 X_4$

$[X_3, X_6] = b_3 X_5$

$[X_3, X_7] = b_7 X_4 + b_3 X_6$

$[X_3, X_8] = b_{10} X_2 + b_9 X_4 + b_7 X_5 + b_3 X_7$

$[X_5, X_8] = d_6 X_2 + d_5 X_4$

$[X_6, X_7] = -(d_6 X_2) + e_1 X_4$

$[X_6, X_8] = e_3 X_4 + (d_5 + e_1) X_5$

$[X_7, X_8] = f_2 X_2 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & b_3 & 0 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & 0 & b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_7 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & -d_6 & 0 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & -b_7 & 0 & 0 & -(d_5 + e_1) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(d_5 + e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (5, 2, 1)

Etapa 4BB1C

Relaciones

R_1: $e_4 \neq 0$

Ley del Álgebra

$[X_1, X_3] = X_2$

$[X_1, X_5] = X_4$

$[X_1, X_6] = X_5$

$[X_1, X_7] = X_6$

$[X_1, X_8] = X_7$

$[X_3, X_7] = b_7 X_4$

$[X_3, X_8] = b_{10} X_2 + b_9 X_4 + b_7 X_5$

$[X_5, X_8] = d_6 X_2 + d_5 X_4$

$[X_6, X_7] = -(d_6 X_2) + e_1 X_4$

$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5$

$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_6 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_6 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_4 \\ 0 & 0 & -b_7 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 + e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -e_4 & 0 \\ 0 & 0 & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & 0 & -b_7 & 0 & 0 & -(d_5 + e_1) & -e_3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -(d_5 + e_1) & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión característica (5, 2, 1)

Etapa 4BB2

Ley del Álgebra

$$[X_1, X_3] = X_2$$

$$[X_1, X_5] = X_4$$

$$[X_1, X_6] = X_5$$

$$[X_1, X_7] = X_6$$

$$[X_1, X_8] = X_7$$

$$[X_2, X_7] = b_5 X_4$$

$$[X_2, X_8] = a_{11} X_4 + b_5 X_5$$

$$[X_3, X_6] = b_5 X_4$$

$$[X_3, X_7] = b_7 X_4 + 2b_5 X_5$$

$$[X_3, X_8] = b_{10} X_2 + b_9 X_4 + (a_{11} + b_7) X_5 + 3b_5 X_6$$

$$[X_5, X_8] = d_5 X_4$$

$$[X_6, X_7] = e_1 X_4$$

$$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_5 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & e_4 \\ 0 & -b_5 & -b_7 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & -2b_5 & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & 0 & -e_4 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -e_4 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -b_5 & -(a_{11}+b_7) & 0 & 0 & -(d_5+e_1) & -e_3 & 0 \\ 0 & 0 & -3b_5 & 0 & 0 & 0 & -(d_5+e_1) & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$\mathrm{J}_1 : \; b_5 b_{10} - b_5 d_5 + 4 b_5 e_1 = 0$

Sucesión Característica de $\mathrm{adj}_{X_1+mX_8}$

$\mathrm{S}_1^8 : \; 3m^4 {b_5}^2 {e_4}^2 = 0$

$\mathrm{S}_2^8 : \; -3m^5 {b_5}^2 {e_4}^2 = 0$

$\mathrm{S}_3^8 : \; -9m^7 {b_5}^3 {e_4}^4 = 0$

$\mathrm{S}_4^8 : \; 9m^7 {b_5}^3 {e_4}^4 = 0$

$\mathrm{S}_5^8 : \; -9m^8 {b_5}^3 {e_4}^4 = 0$

$\mathrm{S}_6^8 : \; 9m^8 {b_5}^3 {e_4}^4 = 0$

$\mathrm{S}_7^8 : \; -27m^8 {b_5}^4 {e_4}^4 = 0$

$\mathrm{S}_8^8 : \; 27m^9 {b_5}^4 {e_4}^4 = 0$

S_9^8 : $5m^2b_5e_4-m^3b_5b_{10}e_4-9m^3b_5d_5e_4+m^4b_5b_{10}d_5e_4+4m^4b_5{d_5}^2e_4-4m^3b_5e_1e_4+4m^4b_5d_5e_1e_4+3m^4a_{11}b_5{e_4}^2 = 0$

S_{10}^8 : $-5m^3b_5e_4 + m^4b_5b_{10}e_4 + 9m^4b_5d_5e_4 - m^5b_5b_{10}d_5e_4 - 4m^5b_5{d_5}^2e_4 + 4m^4b_5e_1e_4 - 4m^5b_5d_5e_1e_4 - 3m^5a_{11}b_5{e_4}^2 = 0$

S_{11}^8 : $3m^4{b_5}^2{e_4}^2 - 3m^5{b_5}^2d_5{e_4}^2 = 0$

S_{12}^8 : $3m^5{b_5}^2{e_4}^2 - 3m^6{b_5}^2d_5{e_4}^2 = 0$

S_{13}^8 : $-15m^5{b_5}^3{e_4}^2+3m^6{b_5}^3b_{10}{e_4}^2+27m^6{b_5}^3d_5{e_4}^2-3m^7{b_5}^3b_{10}d_5{e_4}^2-12m^7{b_5}^3{d_5}^2{e_4}^2+12m^6{b_5}^3e_1{e_4}^2-12m^7{b_5}^3d_5e_1{e_4}^2 = 0$

S_{14}^8 : $3m^5{b_5}^3{e_4}^2 - 6m^6{b_5}^3d_5{e_4}^2 + 3m^7{b_5}^3{d_5}^2{e_4}^2 - 3m^6{b_5}^3e_1{e_4}^2 + 3m^7{b_5}^3d_5e_1{e_4}^2 = 0$

S_{15}^8 : $12m^5{b_5}^3{e_4}^2 - 3m^6{b_5}^3b_{10}{e_4}^2 - 21m^6{b_5}^3d_5{e_4}^2 + 3m^7{b_5}^3b_{10}d_5{e_4}^2 + 9m^7{b_5}^3{d_5}^2{e_4}^2 - 9m^6{b_5}^3e_1{e_4}^2 + 9m^7{b_5}^3d_5e_1{e_4}^2 = 0$

S_{16}^8 : $-15m^6{b_5}^3{e_4}^2+3m^7{b_5}^3b_{10}{e_4}^2+27m^7{b_5}^3d_5{e_4}^2-3m^8{b_5}^3b_{10}d_5{e_4}^2-12m^8{b_5}^3{d_5}^2{e_4}^2+12m^7{b_5}^3e_1{e_4}^2-12m^8{b_5}^3d_5e_1{e_4}^2 = 0$

S_{17}^8 : $3m^6{b_5}^3{e_4}^2 - 6m^7{b_5}^3d_5{e_4}^2 + 3m^8{b_5}^3{d_5}^2{e_4}^2 - 3m^7{b_5}^3e_1{e_4}^2 + 3m^8{b_5}^3d_5e_1{e_4}^2 = 0$

S_{18}^8 : $12m^6{b_5}^3{e_4}^2 - 3m^7{b_5}^3b_{10}{e_4}^2 - 21m^7{b_5}^3d_5{e_4}^2 + 3m^8{b_5}^3b_{10}d_5{e_4}^2 + 9m^8{b_5}^3{d_5}^2{e_4}^2 - 9m^7{b_5}^3e_1{e_4}^2 + 9m^8{b_5}^3d_5e_1{e_4}^2 = 0$

S_{19}^8 : $-3m^6{b_5}^3{e_4}^3 + 3m^7{b_5}^3d_5{e_4}^3 = 0$

S_{20}^8 : $-9m^6{b_5}^3{e_4}^3 + 9m^7{b_5}^3d_5{e_4}^3 = 0$

S_{21}^8 : $-3m^7{b_5}^3{e_4}^3 + 3m^8{b_5}^3d_5{e_4}^3 = 0$

S_{22}^8 : $-9m^7{b_5}^3{e_4}^3 + 9m^8{b_5}^3d_5{e_4}^3 = 0$

S_{23}^8 : $9m^7{b_5}^4{e_4}^3 - 9m^8{b_5}^4d_5{e_4}^3 = 0$

S_{24}^8 : $-9m^7{b_5}^4{e_4}^3 + 9m^8{b_5}^4d_5{e_4}^3 = 0$

S_{25}^8 : $-9m^8{b_5}^4{e_4}^3 + 9m^9{b_5}^4d_5{e_4}^3 = 0$

S_{26}^8 : $-2m^5{b_5}^2{e_4}^3+m^6{b_5}^2b_{10}{e_4}^3+3m^6{b_5}^2d_5{e_4}^3-m^7{b_5}^2b_{10}d_5{e_4}^3-m^7{b_5}^2{d_5}^2{e_4}^3+m^6{b_5}^2e_1{e_4}^3-m^7{b_5}^2d_5e_1{e_4}^3 = 0$

S_{27}^8 : $-2m^6{b_5}^2{e_4}^3+m^7{b_5}^2b_{10}{e_4}^3+3m^7{b_5}^2d_5{e_4}^3-m^8{b_5}^2b_{10}d_5{e_4}^3-m^8{b_5}^2{d_5}^2{e_4}^3+m^7{b_5}^2e_1{e_4}^3-m^8{b_5}^2d_5e_1{e_4}^3 = 0$

S_{28}^8 : $-6m^6{b_5}^3{e_4}^3 + 3m^7{b_5}^3b_{10}{e_4}^3 + 9m^7{b_5}^3d_5{e_4}^3 - 3m^8{b_5}^3b_{10}d_5{e_4}^3 - 3m^8{b_5}^3{d_5}^2{e_4}^3 + 3m^7{b_5}^3e_1{e_4}^3 - 3m^8{b_5}^3d_5e_1{e_4}^3 = 0$

S_{29}^8 : $15m^6{b_5}^3{e_4}^3 - 3m^7{b_5}^3b_{10}{e_4}^3 - 27m^7{b_5}^3d_5{e_4}^3 + 3m^8{b_5}^3b_{10}d_5{e_4}^3 + 12m^8{b_5}^3{d_5}^2{e_4}^3 - 12m^7{b_5}^3e_1{e_4}^3 + 12m^8{b_5}^3d_5e_1{e_4}^3 = 0$

S_{30}^8 : $-15m^7{b_5}^3{e_4}^3+3m^8{b_5}^3b_{10}{e_4}^3+27m^8{b_5}^3d_5{e_4}^3-3m^9{b_5}^3b_{10}d_5{e_4}^3-12m^9{b_5}^3{d_5}^2{e_4}^3+12m^8{b_5}^3e_1{e_4}^3-12m^9{b_5}^3d_5e_1{e_4}^3 = 0$

S_{31}^8 : $6m^7{b_5}^3{e_4}^3-3m^8{b_5}^3b_{10}{e_4}^3-9m^8{b_5}^3d_5{e_4}^3+3m^9{b_5}^3b_{10}d_5{e_4}^3+3m^9{b_5}^3{d_5}^2{e_4}^3-3m^8{b_5}^3e_1{e_4}^3+3m^9{b_5}^3d_5e_1{e_4}^3 = 0$

S_{32}^8 : $12m^4{b_5}^2{e_4}^2-3m^5{b_5}^2b_{10}{e_4}^2-33m^5{b_5}^2d_5{e_4}^2+6m^6{b_5}^2b_{10}d_5{e_4}^2+30m^6{b_5}^2{d_5}^2{e_4}^2-3m^7{b_5}^2b_{10}{d_5}^2{e_4}^2-9m^7{b_5}^2{d_5}^3{e_4}^2-21m^5{b_5}^2e_1{e_4}^2+3m^6{b_5}^2b_{10}e_1{e_4}^2+39m^6{b_5}^2d_5e_1{e_4}^2-3m^7{b_5}^2b_{10}d_5e_1{e_4}^2-18m^7{b_5}^2{d_5}^2e_1{e_4}^2+9m^6{b_5}^2{e_1}^2{e_4}^2-9m^7{b_5}^2d_5{e_1}^2{e_4}^2+6m^6a_{11}{b_5}^2{e_4}^3-3m^6{b_5}^2b_7{e_4}^3-6m^7a_{11}{b_5}^2d_5{e_4}^3+3m^7{b_5}^2b_7d_5{e_4}^3-9m^7a_{11}{b_5}^2e_1{e_4}^3+9m^7{b_5}^3e_3{e_4}^3 = 0$

S^8_{33} : $12m^5b_5{}^2e_4{}^2-3m^6b_5{}^2b_{10}e_4{}^2-33m^6b_5{}^2d_5e_4{}^2+6m^7b_5{}^2b_{10}d_5e_4{}^2+30m^7b_5{}^2d_5{}^2e_4{}^2-3m^8b_5{}^2b_{10}d_5{}^2e_4{}^2-9m^8b_5{}^2d_5{}^3e_4{}^2-21m^6b_5{}^2e_1e_4{}^2+3m^7b_5{}^2b_{10}e_1e_4{}^2+39m^7b_5{}^2d_5e_1e_4{}^2-3m^8b_5{}^2b_{10}d_5e_1e_4{}^2-18m^8b_5{}^2d_5{}^2e_1e_4{}^2+9m^7b_5{}^2e_1{}^2e_4{}^2-9m^8b_5{}^2d_5e_1{}^2e_4{}^2+6m^7a_{11}b_5{}^2e_4{}^3-3m^7b_5{}^2b_7e_4{}^3-6m^8a_{11}b_5{}^2d_5e_4{}^3+3m^8b_5{}^2b_7d_5e_4{}^3-9m^8a_{11}b_5{}^2e_1e_4{}^3+9m^8b_5{}^3e_3e_4{}^3=0$

S^8_{34} : $-9m^5b_5{}^2e_4{}^3+18m^6b_5{}^2d_5e_4{}^3-9m^7b_5{}^2d_5{}^2e_4{}^3+9m^6b_5{}^2e_1e_4{}^3-9m^7b_5{}^2d_5e_1e_4{}^3-9m^7a_{11}b_5{}^2e_4{}^4=0$

S^8_{35} : $15m^5b_5{}^2e_4{}^3-3m^6b_5{}^2b_{10}e_4{}^3-27m^6b_5{}^2d_5e_4{}^3+3m^7b_5{}^2b_{10}d_5e_4{}^3+12m^7b_5{}^2d_5{}^2e_4{}^3-12m^6b_5{}^2e_1e_4{}^3+12m^7b_5{}^2d_5e_1e_4{}^3+9m^7a_{11}b_5{}^2e_4{}^4=0$

S^8_{36} : $-9m^6b_5{}^2e_4{}^3+18m^7b_5{}^2d_5e_4{}^3-9m^8b_5{}^2d_5{}^2e_4{}^3+9m^7b_5{}^2e_1e_4{}^3-9m^8b_5{}^2d_5e_1e_4{}^3-9m^8a_{11}b_5{}^2e_4{}^4=0$

S^8_{37} : $15m^6b_5{}^2e_4{}^3-3m^7b_5{}^2b_{10}e_4{}^3-27m^7b_5{}^2d_5e_4{}^3+3m^8b_5{}^2b_{10}d_5e_4{}^3+12m^8b_5{}^2d_5{}^2e_4{}^3-12m^7b_5{}^2e_1e_4{}^3+12m^8b_5{}^2d_5e_1e_4{}^3+9m^8a_{11}b_5{}^2e_4{}^4=0$

S^8_{38} : $-36m^6b_5{}^3e_4{}^3+9m^7b_5{}^3b_{10}e_4{}^3+63m^7b_5{}^3d_5e_4{}^3-9m^8b_5{}^3b_{10}d_5e_4{}^3-27m^8b_5{}^3d_5{}^2e_4{}^3+27m^7b_5{}^3e_1e_4{}^3-27m^8b_5{}^3d_5e_1e_4{}^3-27m^8a_{11}b_5{}^3e_4{}^4=0$

S^8_{39} : $36m^7b_5{}^3e_4{}^3-9m^8b_5{}^3b_{10}e_4{}^3-63m^8b_5{}^3d_5e_4{}^3+9m^9b_5{}^3b_{10}d_5e_4{}^3+27m^9b_5{}^3d_5{}^2e_4{}^3-27m^8b_5{}^3e_1e_4{}^3+27m^9b_5{}^3d_5e_1e_4{}^3+27m^9a_{11}b_5{}^3e_4{}^4=0$

S^8_{40} : $9m^7b_5{}^3e_4{}^4-9m^8b_5{}^3d_5e_4{}^4=0$

S^8_{41} : $-9m^8b_5{}^3e_4{}^4+9m^9b_5{}^3d_5e_4{}^4=0$

S^8_{42} : $-9m^8b_5{}^4e_4{}^4+9m^9b_5{}^4d_5e_4{}^4=0$

S^8_{43} : (demasiado grande ...)

S^8_{44} : (demasiado grande ...)

S^8_{45} : $2m^4b_5{}^2e_4{}^2-m^5b_5{}^2b_{10}e_4{}^2-5m^5b_5{}^2d_5e_4{}^2+2m^6b_5{}^2b_{10}d_5e_4{}^2+4m^6b_5{}^2d_5{}^2e_4{}^2-m^7b_5{}^2b_{10}d_5{}^2e_4{}^2-m^7b_5{}^2d_5{}^3e_4{}^2-3m^5b_5{}^2e_1e_4{}^2+m^6b_5{}^2b_{10}e_1e_4{}^2+5m^6b_5{}^2d_5e_1e_4{}^2-m^7b_5{}^2b_{10}d_5e_1e_4{}^2-2m^7b_5{}^2d_5{}^2e_1e_4{}^2+m^6b_5{}^2e_1{}^2e_4{}^2-m^7b_5{}^2d_5e_1{}^2e_4{}^2-3m^6b_5{}^3e_4{}^2f_2+3m^7b_5{}^3d_5e_4{}^2f_2=0$

S^8_{46} : $5m^4b_5{}^2e_4{}^2-6m^5b_5{}^2b_{10}e_4{}^2+m^6b_5{}^2b_{10}{}^2e_4{}^2-9m^5b_5{}^2d_5e_4{}^2+10m^6b_5{}^2b_{10}d_5e_4{}^2-m^7b_5{}^2b_{10}{}^2d_5e_4{}^2+4m^6b_5{}^2d_5{}^2e_4{}^2-4m^7b_5{}^2b_{10}d_5{}^2e_4{}^2-4m^5b_5{}^2e_1e_4{}^2+4m^6b_5{}^2b_{10}e_1e_4{}^2+4m^6b_5{}^2d_5e_1e_4{}^2-4m^7b_5{}^2b_{10}d_5e_1e_4{}^2-3m^6a_{11}b_5{}^2e_4{}^3-3m^6b_5{}^2b_7e_4{}^3+3m^7a_{11}b_5{}^2d_5e_4{}^3+3m^7b_5{}^2b_7d_5e_4{}^3-3m^6b_5{}^3e_4{}^2f_2+3m^7b_5{}^3d_5e_4{}^2f_2=0$

S^8_{47} : $22m^4b_5{}^2e_4{}^2-10m^5b_5{}^2b_{10}e_4{}^2+m^6b_5{}^2b_{10}{}^2e_4{}^2-56m^5b_5{}^2d_5e_4{}^2+18m^6b_5{}^2b_{10}d_5e_4{}^2-m^7b_5{}^2b_{10}{}^2d_5e_4{}^2+47m^6b_5{}^2d_5{}^2e_4{}^2-8m^7b_5{}^2b_{10}d_5{}^2e_4{}^2-13m^7b_5{}^2d_5{}^3e_4{}^2-34m^5b_5{}^2e_1e_4{}^2+8m^6b_5{}^2b_{10}e_1e_4{}^2+60m^6b_5{}^2d_5e_1e_4{}^2-8m^7b_5{}^2b_{10}d_5e_1e_4{}^2-26m^7b_5{}^2d_5{}^2e_1e_4{}^2+13m^6b_5{}^2e_1{}^2e_4{}^2-13m^7b_5{}^2d_5e_1{}^2e_4{}^2+6m^6a_{11}b_5{}^2e_4{}^3-3m^6b_5{}^2b_7e_4{}^3-6m^7a_{11}b_5{}^2d_5e_4{}^3+3m^7b_5{}^2b_7d_5e_4{}^3-9m^7a_{11}b_5{}^2e_1e_4{}^3+9m^7b_5{}^3e_3e_4{}^3-3m^6b_5{}^3e_4{}^2f_2+3m^7b_5{}^3d_5e_4{}^2f_2=0$

S^8_{48} : $2m^5b_5{}^2e_4{}^2-m^6b_5{}^2b_{10}e_4{}^2-5m^6b_5{}^2d_5e_4{}^2+2m^7b_5{}^2b_{10}d_5e_4{}^2+4m^7b_5{}^2d_5{}^2e_4{}^2-m^8b_5{}^2b_{10}d_5{}^2e_4{}^2-m^8b_5{}^2d_5{}^3e_4{}^2-3m^6b_5{}^2e_1e_4{}^2+m^7b_5{}^2b_{10}e_1e_4{}^2+5m^7b_5{}^2d_5e_1e_4{}^2-m^8b_5{}^2b_{10}d_5e_1e_4{}^2-2m^8b_5{}^2d_5{}^2e_1e_4{}^2+m^7b_5{}^2e_1{}^2e_4{}^2-m^8b_5{}^2d_5e_1{}^2e_4{}^2-3m^7b_5{}^3e_4{}^2f_2+3m^8b_5{}^3d_5e_4{}^2f_2=0$

S^8_{49} : $5m^5b_5{}^2e_4{}^2-6m^6b_5{}^2b_{10}e_4{}^2+m^7b_5{}^2b_{10}{}^2e_4{}^2-9m^6b_5{}^2d_5e_4{}^2+10m^7b_5{}^2b_{10}d_5e_4{}^2-m^8b_5{}^2b_{10}{}^2d_5e_4{}^2+4m^7b_5{}^2d_5{}^2e_4{}^2-4m^8b_5{}^2b_{10}d_5{}^2e_4{}^2-4m^6b_5{}^2e_1e_4{}^2+4m^7b_5{}^2b_{10}e_1e_4{}^2+4m^7b_5{}^2d_5e_1e_4{}^2-4m^8b_5{}^2b_{10}d_5e_1e_4{}^2-3m^7a_{11}b_5{}^2e_4{}^3-3m^7b_5{}^2b_7e_4{}^3+3m^8a_{11}b_5{}^2d_5e_4{}^3+3m^8b_5{}^2b_7d_5e_4{}^3-3m^7b_5{}^3e_4{}^2f_2+3m^8b_5{}^3d_5e_4{}^2f_2=0$

S^8_{50} : $22m^5b_5{}^2e_4{}^2-10m^6b_5{}^2b_{10}e_4{}^2+m^7b_5{}^2b_{10}{}^2e_4{}^2-56m^6b_5{}^2d_5e_4{}^2+18m^7b_5{}^2b_{10}d_5e_4{}^2-m^8b_5{}^2b_{10}{}^2d_5e_4{}^2+47m^7b_5{}^2d_5{}^2e_4{}^2-8m^8b_5{}^2b_{10}d_5{}^2e_4{}^2-13m^8b_5{}^2d_5{}^3e_4{}^2-34m^6b_5{}^2e_1e_4{}^2+8m^7b_5{}^2b_{10}e_1e_4{}^2+60m^7b_5{}^2d_5e_1e_4{}^2-8m^8b_5{}^2b_{10}d_5e_1e_4{}^2-26m^8b_5{}^2d_5{}^2e_1e_4{}^2+13m^7b_5{}^2e_1{}^2e_4{}^2-13m^8b_5{}^2d_5e_1{}^2e_4{}^2+6m^7a_{11}b_5{}^2e_4{}^3-3m^7b_5{}^2b_7e_4{}^3-6m^8a_{11}b_5{}^2d_5e_4{}^3+3m^8b_5{}^2b_7d_5e_4{}^3-9m^8a_{11}b_5{}^2e_1e_4{}^3+9m^8b_5{}^3e_3e_4{}^3-3m^7b_5{}^3e_4{}^2f_2+3m^8b_5{}^3d_5e_4{}^2f_2=0$

S_{51}^{8} : $-51m^5b_5{}^3e_4{}^2+27m^6b_5{}^3b_{10}e_4{}^2-3m^7b_5{}^3b_{10}{}^2e_4{}^2+126m^6b_5{}^3d_5e_4{}^2-48m^7b_5{}^3b_{10}d_5e_4{}^2+3m^8b_5{}^3b_{10}{}^2d_5e_4{}^2-102m^7b_5{}^3d_5{}^2e_4{}^2+21m^8b_5{}^3b_{10}d_5{}^2e_4{}^2+27m^8b_5{}^3d_5{}^3e_4{}^2+75m^6b_5{}^3e_1e_4{}^2-21m^7b_5{}^3b_{10}e_1e_4{}^2-129m^7b_5{}^3d_5e_1e_4{}^2+21m^8b_5{}^3b_{10}d_5e_1e_4{}^2+54m^8b_5{}^3d_5{}^2e_1e_4{}^2-27m^7b_5{}^3e_1{}^2e_4{}^2+27m^8b_5{}^3d_5e_1{}^2e_4{}^2-18m^7a_{11}b_5{}^3e_4{}^3+9m^7b_5{}^3b_7e_4{}^3+18m^8a_{11}b_5{}^3d_5e_4{}^3-9m^8b_5{}^3b_7d_5e_4{}^3+27m^8a_{11}b_5{}^3e_1e_4{}^3-27m^8b_5{}^4e_3e_4{}^3+9m^7b_5{}^4e_4{}^2f_2-9m^8b_5{}^4d_5e_4{}^2f_2 = 0$

S_{52}^{8} : $51m^6b_5{}^3e_4{}^2-27m^7b_5{}^3b_{10}e_4{}^2+3m^8b_5{}^3b_{10}{}^2e_4{}^2-126m^7b_5{}^3d_5e_4{}^2+48m^8b_5{}^3b_{10}d_5e_4{}^2-3m^9b_5{}^3b_{10}{}^2d_5e_4{}^2+102m^8b_5{}^3d_5{}^2e_4{}^2-21m^9b_5{}^3b_{10}d_5{}^2e_4{}^2-27m^9b_5{}^3d_5{}^3e_4{}^2-75m^7b_5{}^3e_1e_4{}^2+21m^8b_5{}^3b_{10}e_1e_4{}^2+129m^8b_5{}^3d_5e_1e_4{}^2-21m^9b_5{}^3b_{10}d_5e_1e_4{}^2-54m^9b_5{}^3d_5{}^2e_1e_4{}^2+27m^8b_5{}^3e_1{}^2e_4{}^2-27m^9b_5{}^3d_5e_1{}^2e_4{}^2+18m^8a_{11}b_5{}^3e_4{}^3-9m^8b_5{}^3b_7e_4{}^3-18m^9a_{11}b_5{}^3d_5e_4{}^3+9m^9b_5{}^3b_7d_5e_4{}^3-27m^9a_{11}b_5{}^3e_1e_4{}^3+27m^9b_5{}^4e_3e_4{}^3-9m^8b_5{}^4e_4{}^2f_2+9m^9b_5{}^4d_5e_4{}^2f_2 = 0$

S_{53}^{8} : (demasiado grande ...)

S_{54}^{8} : (demasiado grande ...)

S_{55}^{8} : (demasiado grande ...)

S_{56}^{8} : (demasiado grande ...)

S_{57}^{8} : (demasiado grande ...)

S_{58}^{8} : (demasiado grande ...)

S_{59}^{8} : $-7m^5b_5{}^2e_4{}^3+7m^6b_5{}^2b_{10}e_4{}^3-m^7b_5{}^2b_{10}{}^2e_4{}^3+14m^6b_5{}^2d_5e_4{}^3-12m^7b_5{}^2b_{10}d_5e_4{}^3+m^8b_5{}^2b_{10}{}^2d_5e_4{}^3-8m^7b_5{}^2d_5{}^2e_4{}^3+5m^8b_5{}^2b_{10}d_5{}^2e_4{}^3+m^8b_5{}^2d_5{}^3e_4{}^3+7m^6b_5{}^2e_1e_4{}^3-5m^7b_5{}^2b_{10}e_1e_4{}^3-9m^7b_5{}^2d_5e_1e_4{}^3+5m^8b_5{}^2b_{10}d_5e_1e_4{}^3+2m^8b_5{}^2d_5{}^2e_1e_4{}^3-m^7b_5{}^2e_1{}^2e_4{}^3+m^8b_5{}^2d_5e_1{}^2e_4{}^3+3m^7a_{11}b_5{}^2e_4{}^4+3m^7b_5{}^2b_7e_4{}^4-3m^8a_{11}b_5{}^2d_5e_4{}^4-3m^8b_5{}^2b_7d_5e_4{}^4+3m^7b_5{}^3e_4{}^3f_2-3m^8b_5{}^3d_5e_4{}^3f_2 = 0$

S_{60}^{8} : $7m^6b_5{}^2e_4{}^3-7m^7b_5{}^2b_{10}e_4{}^3+m^8b_5{}^2b_{10}{}^2e_4{}^3-14m^7b_5{}^2d_5e_4{}^3+12m^8b_5{}^2b_{10}d_5e_4{}^3-m^9b_5{}^2b_{10}{}^2d_5e_4{}^3+8m^8b_5{}^2d_5{}^2e_4{}^3-5m^9b_5{}^2b_{10}d_5{}^2e_4{}^3-m^9b_5{}^2d_5{}^3e_4{}^3-7m^7b_5{}^2e_1e_4{}^3+5m^8b_5{}^2b_{10}e_1e_4{}^3+9m^8b_5{}^2d_5e_1e_4{}^3-5m^9b_5{}^2b_{10}d_5e_1e_4{}^3-2m^9b_5{}^2d_5{}^2e_1e_4{}^3+m^8b_5{}^2e_1{}^2e_4{}^3-m^9b_5{}^2d_5e_1{}^2e_4{}^3-3m^8a_{11}b_5{}^2e_4{}^4-3m^8b_5{}^2b_7e_4{}^4+3m^9a_{11}b_5{}^2d_5e_4{}^4+3m^9b_5{}^2b_7d_5e_4{}^4-3m^8b_5{}^3e_4{}^3f_2+3m^9b_5{}^3d_5e_4{}^3f_2 = 0$

Sucesión característica (5, 2, 1)

Etapa 4BB3

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_5] = X_4$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_4$$
$$[X_2, X_7] = a_9 X_4$$
$$[X_2, X_8] = a_{11} X_4 + a_9 X_5$$

$$[X_3, X_5] = b_3 X_4$$
$$[X_3, X_6] = b_5 X_4 + b_3 X_5$$
$$[X_3, X_7] = b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$$
$$[X_3, X_8] = b_{10} X_2 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$$

$$[X_5, X_8] = d_5 X_4$$

$$[X_6, X_7] = e_1 X_4$$
$$[X_6, X_8] = e_3 X_4 + (d_5 + e_1) X_5$$

$$[X_7, X_8] = f_2 X_2 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_9 & -b_7 & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & -(a_9+b_5) & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} & 0 & 0 & 0 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11}+b_7) & 0 & 0 & -(d_5+e_1) & -e_3 & 0 \\ 0 & 0 & -2a_9-b_5 & 0 & 0 & 0 & -(d_5+e_1) & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$\mathrm{J}_1 : \; a_9b_{10} - a_9d_5 + 2a_9e_1 + 2b_5e_1 - a_1f_2 = 0$

Sucesión característica (5, 2, 1)

Etapa 4BBX

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_5] = X_4$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_4$$
$$[X_2, X_7] = a_9 X_4$$
$$[X_2, X_8] = a_{11} X_4 + a_9 X_5$$

$$[X_3, X_5] = b_3 X_4$$
$$[X_3, X_6] = b_5 X_4 + b_3 X_5$$
$$[X_3, X_7] = b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$$
$$[X_3, X_8] = \left(b_{10} - \tfrac{a_1 f_2}{b_5}\right) X_2 + b_9 X_4 + (a_{11} + b_7) X_5 + (2a_9 + b_5) X_6 + b_3 X_7$$

$$[X_5, X_8] = d_5 X_4$$

$$[X_6, X_7] = \left(e_1 + \tfrac{a_1 f_2}{2b_5}\right) X_4$$
$$[X_6, X_8] = e_3 X_4 + \left(d_5 + e_1 + \tfrac{a_1 f_2}{2b_5}\right) X_5$$

$$[X_7, X_8] = f_2 X_2 + f_1 X_4 + e_3 X_5 + \left(d_5 + e_1 + \tfrac{a_1 f_2}{2b_5}\right) X_6$$

Adjuntas

$$\mathrm{adj}_{X_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_2} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_9 & a_{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_3} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & b_{10} - \frac{a_1 f_2}{b_5} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_1 & 0 & 0 & b_3 & b_5 & b_7 & b_9 \\ 0 & 0 & 0 & 0 & 0 & b_3 & a_9 + b_5 & a_{11} + b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & b_3 & 2a_9 + b_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_4} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_5} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_6} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_5 & 0 & 0 & 0 & e_1 + \frac{a_1 f_2}{2b_5} & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 + \frac{a_1 f_2}{2b_5} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_7} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & f_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_9 & -b_7 & 0 & 0 & -e_1 - \frac{a_1 f_2}{2b_5} & 0 & f_1 \\ 0 & 0 & -(a_9 + b_5) & 0 & 0 & 0 & 0 & e_3 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & d_5 + e_1 + \frac{a_1 f_2}{2b_5} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}_{X_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_{10} + \frac{a_1 f_2}{b_5} & 0 & 0 & 0 & -f_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{11} & -b_9 & 0 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & -a_9 & -(a_{11} + b_7) & 0 & 0 & -d_5 - e_1 - \frac{a_1 f_2}{2b_5} & -e_3 & 0 \\ 0 & 0 & -2a_9 - b_5 & 0 & 0 & 0 & -d_5 - e_1 - \frac{a_1 f_2}{2b_5} & 0 \\ -1 & 0 & -b_3 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Jacobi

$\mathrm{J}_1 : \; a_9 b_{10} - a_9 d_5 + 2a_9 e_1 + 2b_5 e_1 = 0$

Sucesión característica (5, 2, 1)

Etapa 4PR ()

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_5] = X_4$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_4$$
$$[X_2, X_7] = a_9 X_4$$
$$[X_2, X_8] = a_9 X_5$$

$$[X_3, X_5] = b_3 X_4$$
$$[X_3, X_6] = b_5 X_4 + b_3 X_5$$
$$[X_3, X_7] = \frac{5 d_3 X_2}{3} + b_7 X_4 + (a_9 + b_5) X_5 + b_3 X_6$$
$$[X_3, X_8] = b_{10} X_2 + \frac{5 d_3 X_3}{3} + b_9 X_4 + b_7 X_5 + (2 a_9 + b_5) X_6 + b_3 X_7$$

$$[X_4, X_8] = -2 d_4 X_2 - \frac{5 d_3 X_4}{3}$$

$$[X_5, X_7] = d_4 X_2 + d_3 X_4$$
$$[X_5, X_8] = d_6 X_2 - d_4 X_3 + d_5 X_4 - \frac{2 d_3 X_5}{3}$$

$$[X_6, X_7] = -(d_6 X_2) + d_4 X_3 + e_1 X_4 + d_3 X_5$$
$$[X_6, X_8] = e_4 X_2 + e_3 X_4 + (d_5 + e_1) X_5 + \frac{d_3 X_6}{3}$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + f_1 X_4 + e_3 X_5 + (d_5 + e_1) X_6 + \frac{d_3 X_7}{3}$$

RELACIONES

R_1: $d_4 \neq 0$

$a_1 d_4 \rightarrow 0$

$a_9 d_4 \rightarrow 0$

$b_3 d_4 \rightarrow 0$

$a_1 d_6 \rightarrow 0$

$b_5 d_4 \rightarrow 0$

$\frac{5 b_3 d_3}{3} \rightarrow 0$

$\frac{-2 a_1 d_3}{3} \rightarrow 0$

$0 \rightarrow 0$

JACOBI

$J_1 : \frac{10 a_1 d_3}{3} = 0$

$J_2 : 3 a_9 d_3 + \frac{11 b_5 d_3}{3} = 0$

$J_3 : -(b_{10} d_4) + d_4 d_5 - \frac{5 d_3 d_6}{3} + 3 d_4 e_1 = 0$

$J_4 : \frac{11 b_5 d_3}{3} - a_1 e_4 = 0$

$J_5 : 3 a_9 d_3 + a_1 e_4 = 0$

$J_6 : \frac{4 {d_3}^2}{3} - b_7 d_4 + a_9 d_6 - b_3 e_4 = 0$

$J_7 : \frac{10 {d_3}^2}{3} + 3 b_7 d_4 - 3 a_9 d_6 - 2 b_5 d_6 - b_3 e_4 = 0$

$J_8 : -(b_9 d_4) + \frac{10 d_3 e_1}{3} + a_9 e_4 - b_5 e_4 = 0$

$J_9 : a_9 b_{10} + \frac{14 b_7 d_3}{3} - a_9 d_5 + 2 a_9 e_1 + 2 b_5 e_1 - a_1 f_2 = 0$

NILPOTENCIA

$N_1 : \frac{-28 {d_3}^2}{9} + b_7 d_4 - a_9 d_6 - b_3 e_4 = 0$

$N_2 : \frac{-2 {d_3}^3}{27} - b_7 d_3 d_4 - \frac{2 a_9 d_3 d_6}{3} + 2 b_3 d_3 e_4 = 0$

$N_3 : \frac{25 {d_3}^4}{27} - b_7 {d_3}^2 d_4 - 2 a_9 b_9 {d_4}^2 + \frac{8 a_9 {d_3}^2 d_6}{3} - \frac{b_3 {d_3}^2 e_4}{3} + 2 {a_9}^2 d_4 e_4 + a_9 b_3 d_6 e_4 = 0$

$N_4 : \frac{50 {d_3}^5}{243} - \frac{5 b_7 {d_3}^3 d_4}{27} - \frac{4 a_9 b_9 d_3 {d_4}^2}{3} + \frac{50 a_9 {d_3}^3 d_6}{27} + 4 {a_9}^2 {d_4}^2 e_3 + 2 a_9 b_5 {d_4}^2 e_3 - \frac{10 b_3 {d_3}^3 e_4}{27} - \frac{8 {a_9}^2 d_3 d_4 e_4}{3} - \frac{4 a_9 b_3 d_3 d_6 e_4}{3} + 2 a_9 b_3 {d_4}^2 f_1 = 0$

$N_5 : \frac{-2 a_9 b_9 {d_3}^2 {d_4}^2}{9} + \frac{25 a_9 {d_3}^4 d_6}{81} + \frac{4 {a_9}^2 d_3 {d_4}^2 e_3}{3} + \frac{2 a_9 b_5 d_3 {d_4}^2 e_3}{3} - 2 a_9 b_3 {d_4}^2 d_5 e_3 - 2 a_9 b_3 {d_4}^2 e_1 e_3 - \frac{10 {a_9}^2 {d_3}^2 d_4 e_4}{9} - \frac{5 a_9 b_3 {d_3}^2 d_6 e_4}{9} + \frac{2 a_9 b_3 d_3 {d_4}^2 f_1}{3} = 0$

SUCESISN CARACTERMSTICA (5, 1, 1, 1)

ETAPA 1

LEY DEL ÁLGEBRA

$$[x_1, x_5] = x_4$$

$$[x_1, x_6] = x_5$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_3] = a_1 x_4$$

$$[x_2, x_7] = a_{13} x_4$$

$$[x_2, x_8] = a_{18} x_2 + a_{17} x_3 + a_{16} x_4 + a_{13} x_5$$

$$[x_3, x_6] = b_7 x_4$$

$$[x_3, x_7] = b_{10} x_4 + b_7 x_5$$

$$[x_3, x_8] = b_{15} x_2 + b_{14} x_3 + b_{13} x_4 + b_{10} x_5 + b_7 x_6$$

$$[x_5, x_8] = d_9 x_2 + d_8 x_3$$

$$[x_6, x_7] = -(d_9 x_2) - d_8 x_3 + e_1 x_4$$

$$[x_6, x_8] = e_4 x_4 + e_1 x_5$$

$$[x_7, x_8] = f_3 x_2 + f_2 x_3 + f_1 x_4 + e_4 x_5 + e_1 x_6$$

ADJUNTAS

$$\text{adj}(x_1)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_2)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{18} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{17} \\ 0 & 0 & a_1 & 0 & 0 & 0 & a_{13} & a_{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{13} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_3)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{15} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_{14} \\ 0 & -a_1 & 0 & 0 & 0 & b_7 & b_{10} & b_{13} \\ 0 & 0 & 0 & 0 & 0 & 0 & b_7 & b_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & b_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_4)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_5)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_8 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_6)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_9 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -d_8 & 0 \\ 0 & 0 & -b_7 & 0 & 0 & 0 & e_1 & e_4 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_7)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_9 & 0 & f_3 \\ 0 & 0 & 0 & 0 & 0 & d_8 & 0 & f_2 \\ 0 & -a_{13} & -b_{10} & 0 & 0 & -e_1 & 0 & f_1 \\ 0 & 0 & -b_7 & 0 & 0 & 0 & 0 & e_4 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_8)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{18} & -b_{15} & 0 & -d_9 & 0 & -f_3 & 0 \\ 0 & -a_{17} & -b_{14} & 0 & -d_8 & 0 & -f_2 & 0 \\ 0 & -a_{16} & -b_{13} & 0 & 0 & -e_4 & -f_1 & 0 \\ 0 & -a_{13} & -b_{10} & 0 & 0 & -e_1 & -e_4 & 0 \\ 0 & 0 & -b_7 & 0 & 0 & 0 & -e_1 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

BASE DE GROEBNER DE LAS RELACIONES OBTENIDAS (J,N,S1)

$G_1 : b_{15}\, d_8 - b_{14}\, d_9 = 0$

$G_2 : b_7\, d_9 = 0$

$G_3 : b_7\, d_8 = 0$

$G_4 : b_7\, b_{14} = 0$

$G_5 : {b_7}^2\, f_2 = 0$

$G_6 : a_{18} + b_{14} = 0$

$G_7 : b_{14}\, d_8 + a_{17}\, d_9 = 0$

$G_8 : -{b_{14}}^2 - a_{17}\, b_{15} = 0$

$G_9 : a_{17}\, b_7 = 0$

$G_{10} : b_{13}\, d_8 + a_{16}\, d_9 - b_7\, f_2 = 0$

$G_{11} : -(b_{13}\, b_{14}\, d_8) - a_{16}\, b_{15}\, d_8 = 0$

$G_{12} : -(a_{17}\, b_{13}\, d_8) + a_{16}\, b_{14}\, d_8 = 0$

$G_{13} : -(b_{10}\, d_8) - a_{13}\, d_9 = 0$

$G_{14} : -(b_{10}\, b_{14}\, d_8) - a_{13}\, b_{15}\, d_8 = 0$

$G_{15} : b_{10}\, b_{14}\, f_2 + a_{13}\, b_{15}\, f_2 + 2\, b_7\, e_1\, f_2 + a_{17}\, b_{10}\, f_3 - a_{13}\, b_{14}\, f_3 = 0$

$G_{16} : a_{17}\, b_{10}\, d_8 - a_{13}\, b_{14}\, d_8 = 0$

$G_{17} : -\left(a_{16}\, b_{10}\, {d_8}^2\right) + a_{13}\, b_{13}\, {d_8}^2 = 0$

$G_{18} : -((a_{16}\, b_{10} - a_{13}\, b_{13})\, d_8) - a_{13}\, b_7\, f_2 = 0$

$G_{19} : a_{16}\, a_{17}\, b_{10}\, d_8 - a_{13}\, a_{17}\, b_{13}\, d_8 = 0$

$G_{20} : b_{10}\, b_{14} + a_{13}\, b_{15} + 2\, b_7\, e_1 - a_1\, f_3 = 0$

$G_{21} : a_{17}\, b_{10} - a_{13}\, b_{14} + a_1\, f_2 = 0$

$G_{22} : a_1\, d_9 = 0$

$G_{23} : -(a_1\, d_8) = 0$

SUCESIÓN CARACTERÍSTICA (5, 1, 1, 1)

ETAPA 1A

28/1/1992

LEY DEL ÁLGEBRA

$$[x_1, x_5] = x_4$$

$$[x_1, x_6] = x_5$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_3] = a_1\, x_4$$

$$[x_2, x_7] = a_{13}\, x_4$$

$$[x_2, x_8] = a_{16}\, x_4 + a_{13}\, x_5$$

$$[x_3, x_6] = b_7\, x_4$$

$$[x_3, x_7] = b_{10}\, x_4 + b_7\, x_5$$

$$[x_3, x_8] = b_{15}\, x_2 + b_{13}\, x_4 + b_{10}\, x_5 + b_7\, x_6$$

$$[x_6, x_7] = e_1\, x_4$$

$$[x_6, x_8] = e_4\, x_4 + e_1\, x_5$$

$$[x_7, x_8] = f_3\, x_2 + f_1\, x_4 + e_4\, x_5 + e_1\, x_6$$

RELACIONES

R_1: $b_7 \neq 0 \Leftarrow E1A$

RELACIONES OBTENIDAS (TODAS: J, N, SC)

G_1 : $a_{13}\, b_{15} + 2\, b_7\, e_1 - a_1\, f_3 = 0$

SOLUCIÓN 1

$a_1 \rightarrow \frac{a_{13}\, b_{15} + 2\, b_7\, e_1}{f_3}$

SOLUCIÓN 2

$a_{13} \rightarrow \frac{-2\, b_7\, e_1}{b_{15}}$

$f_3 \rightarrow 0$

SOLUCIÓN 3

$b_7 \rightarrow 0$

$b_{15} \rightarrow 0$

$f_3 \rightarrow 0$

SOLUCIÓN 4

$b_{15} \rightarrow 0$

$e_1 \rightarrow 0$

$f_3 \rightarrow 0$

SUCESIÓN CARACTERÍSTICA (5, 1, 1, 1)

ETAPA 1B

29/1/1992

LEY DEL ÁLGEBRA

$$[x_1, x_5] = x_4$$

$$[x_1, x_6] = x_5$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_3] = a_1\, x_4$$

$$[x_2, x_7] = a_{13}\, x_4$$

$$[x_2, x_8] = a_{18}\, x_2 + a_{17}\, x_3 + a_{16}\, x_4 + a_{13}\, x_5$$

$$[x_3, x_7] = b_{10}\, x_4$$

$$[x_3, x_8] = b_{15}\, x_2 + b_{14}\, x_3 + b_{13}\, x_4 + b_{10}\, x_5$$

$$[x_6, x_7] = e_1\, x_4$$

$$[x_6, x_8] = e_4\, x_4 + e_1\, x_5$$

$$[x_7, x_8] = f_3\, x_2 + f_2\, x_3 + f_1\, x_4 + e_4\, x_5 + e_1\, x_6$$

RELACIONES

R_1: $b_7 = 0 \Leftarrow E1B$

R_2: $a_1 \neq 0 \Leftarrow E1B$

Base de Groebner de las relaciones (todas: J, N, SC)

$G_1 : a_{18} + b_{14} = 0$

$G_2 : -{b_{14}}^2 - a_{17}\, b_{15} = 0$

$G_3 : b_{10}\, b_{14}\, f_2 + a_{13}\, b_{15}\, f_2 + a_{17}\, b_{10}\, f_3 - a_{13}\, b_{14}\, f_3 = 0$

$G_4 : b_{10}\, b_{14} + a_{13}\, b_{15} - a_1\, f_3 = 0$

$G_5 : a_{17}\, b_{10} - a_{13}\, b_{14} + a_1\, f_2 = 0$

Solución 1

$f_3 \rightarrow \frac{b_{14}\left(b_{10} - \frac{a_{13}\, b_{14}}{a_{17}}\right)}{a_1}$

$f_2 \rightarrow \frac{-(a_{17}\, b_{10}) + a_{13}\, b_{14}}{a_1}$

$b_{15} \rightarrow -\frac{{b_{14}}^2}{a_{17}}$

$a_{18} \rightarrow -b_{14}$

Solución 2

$f_3 \rightarrow \frac{a_{13}\, b_{15}}{a_1}$

$f_2 \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$b_{14} \rightarrow 0$

SOLUCIÓN 3

$f_3 \rightarrow \frac{a_{13}\, b_{15}}{a_1}$

$f_2 \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$b_{14} \rightarrow 0$

SUCESIÓN CARACTERÍSTICA (5, 1, 1, 1)

ETAPA 1C

29/1/1992

LEY DEL ÁLGEBRA

$$[x_1, x_5] = x_4$$

$$[x_1, x_6] = x_5$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_7] = a_{13}\, x_4$$

$$[x_2, x_8] = a_{18}\, x_2 + a_{17}\, x_3 + a_{16}\, x_4 + a_{13}\, x_5$$

$$[x_3, x_7] = b_{10}\, x_4$$

$$[x_3, x_8] = b_{15}\, x_2 + b_{14}\, x_3 + b_{13}\, x_4 + b_{10}\, x_5$$

$$[x_5, x_8] = d_9\, x_2 + d_8\, x_3$$

$$[x_6, x_7] = -(d_9\, x_2) - d_8\, x_3 + e_1\, x_4$$

$$[x_6, x_8] = e_4\, x_4 + e_1\, x_5$$

$$[x_7, x_8] = f_3\, x_2 + f_2\, x_3 + f_1\, x_4 + e_4\, x_5 + e_1\, x_6$$

RELACIONES

R_1: $b_7 = a_1 = 0 \Leftarrow E1C$

BASE DE GROEBNER (J, N, SC1)

$G_1 : b_{15}\, d_8 - b_{14}\, d_9 = 0$

$G_2 : a_{18} + b_{14} = 0$

$G_3 : b_{14}\, d_8 + a_{17}\, d_9 = 0$

$G_4 : -{b_{14}}^2 - a_{17}\, b_{15} = 0$

$G_5 : b_{13}\, d_8 + a_{16}\, d_9 = 0$

$G_6 : -(b_{13}\, b_{14}\, d_8) - a_{16}\, b_{15}\, d_8 = 0$

$G_7 : -(a_{17}\, b_{13}\, d_8) + a_{16}\, b_{14}\, d_8 = 0$

$G_8 : -(b_{10}\, d_8) - a_{13}\, d_9 = 0$

$G_9 : b_{10}\, b_{14} + a_{13}\, b_{15} = 0$

$G_{10} : a_{17}\, b_{10} - a_{13}\, b_{14} = 0$

$G_{11} : -(a_{16}\, b_{10}\, d_8) + a_{13}\, b_{13}\, d_8 = 0$

SOLUCIÓN 1

$d_9 \to 0$

$d_8 \to 0$

$b_{15} \to -\frac{{a_{18}}^2}{a_{17}}$

$b_{14} \to -a_{18}$

$b_{10} \to -\frac{a_{13}\, a_{18}}{a_{17}}$

SOLUCIÓN 2

$d_9 \rightarrow \frac{a_{18}\, d_8}{a_{17}}$

$b_{15} \rightarrow -\frac{{a_{18}}^2}{a_{17}}$

$b_{14} \rightarrow -a_{18}$

$b_{13} \rightarrow -\frac{a_{16}\, a_{18}}{a_{17}}$

$b_{10} \rightarrow -\frac{a_{13}\, a_{18}}{a_{17}}$

SOLUCIÓN 3

$d_9 \rightarrow \frac{a_{18}\, d_8}{a_{17}}$

$b_{15} \rightarrow -\frac{{a_{18}}^2}{a_{17}}$

$b_{14} \rightarrow -a_{18}$

$b_{13} \rightarrow 0$

$b_{10} \rightarrow -\frac{a_{13}\, a_{18}}{a_{17}}$

$a_{16} \rightarrow 0$

SOLUCIÓN 4

$d_9 \rightarrow \frac{a_{18}\, d_8}{a_{17}}$

$b_{15} \rightarrow -\frac{{a_{18}}^2}{a_{17}}$

$b_{14} \rightarrow -a_{18}$

$b_{13} \rightarrow -\frac{a_{16}\, a_{18}}{a_{17}}$

$b_{10} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 5

$d_9 \rightarrow \frac{a_{18}\, d_8}{a_{17}}$

$b_{15} \rightarrow -\frac{{a_{18}}^2}{a_{17}}$

$b_{14} \rightarrow -a_{18}$

$b_{13} \rightarrow 0$

$b_{10} \rightarrow 0$

$a_{16} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 6

$d_9 \rightarrow 0$

$d_8 \rightarrow 0$

$b_{15} \rightarrow 0$

$b_{14} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

SOLUCIÓN 7

$d_9 \rightarrow -\frac{b_{10}\, d_8}{a_{13}}$

$b_{15} \rightarrow 0$

$b_{14} \rightarrow 0$

$b_{13} \rightarrow \frac{a_{16}\, b_{10}}{a_{13}}$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

SOLUCIÓN 8

$d_9 \rightarrow 0$

$d_8 \rightarrow 0$

$b_{14} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 9

$d_8 \rightarrow 0$

$b_{14} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{16} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 10

$d_9 \rightarrow 0$

$d_8 \rightarrow 0$

$b_{14} \rightarrow 0$

$b_{10} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 11

$d_8 \rightarrow 0$

$b_{14} \rightarrow 0$

$b_{10} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{16} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 12

$d_9 \rightarrow -\frac{b_{13}\, d_8}{a_{16}}$

$b_{15} \rightarrow 0$

$b_{14} \rightarrow 0$

$b_{10} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 13

$d_8 \rightarrow 0$

$b_{15} \rightarrow 0$

$b_{14} \rightarrow 0$

$b_{10} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{16} \rightarrow 0$

$a_{13} \rightarrow 0$

SOLUCIÓN 14

$b_{15} \rightarrow 0$

$b_{14} \rightarrow 0$

$b_{13} \rightarrow 0$

$b_{10} \rightarrow 0$

$a_{18} \rightarrow 0$

$a_{17} \rightarrow 0$

$a_{16} \rightarrow 0$

$a_{13} \rightarrow 0$

Sucesión Característica (4, 3, 1)

Etapa 1

9/3/1992

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_4] = X_3$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_5$$
$$[X_2, X_4] = a_4 X_2 + a_3 X_5 + a_1 X_6$$
$$[X_2, X_7] = -(a_4 X_5)$$
$$[X_2, X_8] = a_{12} X_2 + a_{11} X_5 - a_4 X_6$$

$$[X_3, X_4] = b_2 X_2 + a_4 X_3 + b_1 X_5 + a_3 X_6 + a_1 X_7$$
$$[X_3, X_6] = a_4 X_5$$
$$[X_3, X_7] = b_8 X_2 + b_7 X_5$$
$$[X_3, X_8] = b_{10} X_2 + (a_{12} + b_8)\, X_3 + b_9 X_5 + (a_{11} + b_7)\, X_6 - a_4 X_7$$

$$[X_4, X_6] = c_4 X_2 + c_3 X_5 + a_4 X_6$$
$$[X_4, X_7] = c_6 X_2 + (b_8 + c_4)\, X_3 + c_5 X_5 + (b_7 + c_3)\, X_6 + a_4 X_7$$
$$[X_4, X_8] = c_8 X_2 + (b_{10} + c_6)\, X_3 + (a_{12} + 2\, b_8 + c_4)\, X_4 + c_7 X_5 + (b_9 + c_5)\, X_6 + (a_{11} + 2\, b_7 + c_3)\, X_7$$

$$[X_5, X_8] = d_6 X_2 + d_5 X_5$$

$$[X_6, X_7] = e_2 X_2 + e_1 X_5$$
$$[X_6, X_8] = e_4 X_2 + (d_6 + e_2)\, X_3 + e_3 X_5 + (d_5 + e_1)\, X_6$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + (d_6 + e_2)\ X_4 + f_1 X_5 + e_3 X_6 + (d_5 + e_1)\ X_7$$

ADJUNTAS

$$\text{adj}(x_1)= \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_2)= \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & a_4 & 0 & 0 & 0 & a_{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & a_1 & a_3 & 0 & 0 & -a_4 & a_{11} \\ 0 & 0 & 0 & a_1 & 0 & 0 & 0 & -a_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_3)= \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & b_2 & 0 & 0 & b_8 & b_{10} \\ 0 & 0 & 0 & a_4 & 0 & 0 & 0 & a_{12} + b_8 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_1 & 0 & b_1 & 0 & a_4 & b_7 & b_9 \\ 0 & 0 & 0 & a_3 & 0 & 0 & 0 & a_{11} + b_7 \\ 0 & 0 & 0 & a_1 & 0 & 0 & 0 & -a_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_4)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_4 & -b_2 & 0 & 0 & c_4 & c_6 & c_8 \\ -1 & 0 & -a_4 & 0 & 0 & 0 & b_8+c_4 & b_{10}+c_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{12}+2\,b_8+c_4 \\ 0 & -a_3 & -b_1 & 0 & 0 & c_3 & c_5 & c_7 \\ 0 & -a_1 & -a_3 & 0 & 0 & a_4 & b_7+c_3 & b_9+c_5 \\ 0 & 0 & -a_1 & 0 & 0 & 0 & a_4 & a_{11}+2\,b_7+c_3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_5)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_6)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -c_4 & 0 & 0 & e_2 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6+e_2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & -a_4 & -c_3 & 0 & 0 & e_1 & e_3 \\ 0 & 0 & 0 & -a_4 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_7)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -b_8 & -c_6 & 0 & -e_2 & 0 & f_2 \\ 0 & 0 & 0 & -b_8-c_4 & 0 & 0 & 0 & e_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & d_6+e_2 \\ 0 & a_4 & -b_7 & -c_5 & 0 & -e_1 & 0 & f_1 \\ -1 & 0 & 0 & -b_7-c_3 & 0 & 0 & 0 & e_3 \\ 0 & 0 & 0 & -a_4 & 0 & 0 & 0 & d_5+e_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\text{adj}(x_8)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{12} & -b_{10} & -c_8 & -d_6 & -e_4 & -f_2 & 0 \\ 0 & 0 & -a_{12}-b_8 & -b_{10}-c_6 & 0 & -d_6-e_2 & -e_4 & 0 \\ 0 & 0 & 0 & -a_{12}-2\,b_8-c_4 & 0 & 0 & -d_6-e_2 & 0 \\ 0 & -a_{11} & -b_9 & -c_7 & -d_5 & -e_3 & -f_1 & 0 \\ 0 & a_4 & -a_{11}-b_7 & -b_9-c_5 & 0 & -d_5-e_1 & -e_3 & 0 \\ -1 & 0 & a_4 & -a_{11}-2\,b_7-c_3 & 0 & 0 & -d_5-e_1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión Característica (4, 3, 1)

Etapa 1A

9/3/1992

Ley del Álgebra

$\mu(X_1, X_3) = X_2$

$\mu(X_1, X_4) = X_3$

$\mu(X_1, X_6) = X_5$

$\mu(X_1, X_7) = X_6$

$\mu(X_1, X_8) = X_7$

$\mu(X_3, X_4) = b_2 X_2 + b_1 X_5$

$\mu(X_3, X_7) = b_8 X_2 + b_7 X_5$

$\mu(X_3, X_8) = b_{10} X_2 + b_8 X_3 + b_9 X_5 + b_7 X_6$

$\mu(X_4, X_6) = c_4 X_2 + c_3 X_5$

$\mu(X_4, X_7) = c_6 X_2 + (b_8 + c_4)\ X_3 + c_5 X_5 + (b_7 + c_3)\ X_6$

$\mu(X_4, X_8) = c_8 X_2 + (b_{10} + c_6)\ X_3 + (2\,b_8 + c_4)\ X_4 + c_7 X_5 + (b_9 + c_5)\ X_6 + (2\,b_7 + c_3)\ X_7$

$\mu(X_5, X_8) = d_6 X_2 + d_5 X_5$

$\mu(X_6, X_7) = e_2 X_2 + e_1 X_5$

$\mu(X_6, X_8) = e_4 X_2 + (d_6 + e_2)\ X_3 + e_3 X_5 + (d_5 + e_1)\ X_6$

$\mu(X_7, X_8) = f_2 X_2 + e_4 X_3 + (d_6 + e_2)\ X_4 + f_1 X_5 + e_3 X_6 + (d_5 + e_1)\ X_7$

RELACIONES

R_1: $X_2 central \Leftarrow E1A$

Relaciones de Jacobi

$J_1 : b_7\,b_8 + 2\,b_8\,c_3 + c_3\,c_4 = 0$

$J_2 : 2\,{b_7}^2 + 3\,b_1\,b_8 + b_1\,c_4 - b_1\,d_5 = 0$

$J_3 : 3\,b_2\,b_8 + 2\,b_7\,b_8 + b_8\,c_3 + b_2\,c_4 - b_7\,c_4 - b_1\,d_6 = 0$

$J_4 : 2\,b_8\,c_3 + c_3\,c_4 - b_1\,d_6 - 2\,b_7\,e_1 - b_1\,e_2 = 0$

$J_5 : b_7\,b_8 + b_1\,d_6 + 2\,b_7\,e_1 + b_1\,e_2 = 0$

$J_6 : {b_8}^2 + b_8\,d_5 + b_2\,d_6 - b_7\,d_6 + b_8\,e_1 + b_2\,e_2 + b_7\,e_2 = 0$

$J_7 : 2\,b_8\,c_4 + {c_4}^2 + c_4\,d_5 - b_2\,d_6 - c_3\,d_6 + c_4\,e_1 - b_2\,e_2 - 2\,b_7\,e_2 - c_3\,e_2 = 0$

$J_8 : {b_8}^2 + 2\,b_8\,c_4 + {c_4}^2 + b_8\,d_5 + c_4\,d_5 - b_7\,d_6 - c_3\,d_6 + b_8\,e_1 + c_4\,e_1 - b_7\,e_2 - c_3\,e_2 = 0$

$J_9 : b_7\,d_6 - c_3\,d_6 + d_5\,e_1 + 2\,{e_1}^2 + b_7\,e_2 - c_3\,e_2 = 0$

$J_{10} : b_8\,d_6 - c_4\,d_6 - d_6\,e_1 + b_8\,e_2 - c_4\,e_2 + 2\,d_5\,e_2 + 2\,e_1\,e_2 = 0$

$J_{11} : -(b_8\,b_9) + b_7\,b_{10} - b_9\,c_4 + 2\,b_8\,c_5 + c_4\,c_5 + b_7\,c_6 + b_9\,e_1 + 2\,c_5\,e_1 - b_7\,e_3 - b_1\,e_4 = 0$

$J_{12} : -(b_{10}\,c_4) + 3\,b_8\,c_6 + c_4\,c_6 + c_6\,d_5 - c_5\,d_6 + c_6\,e_1 + b_9\,e_2 + c_5\,e_2 + c_4\,e_3 - b_2\,e_4 - b_7\,e_4 - c_3\,e_4 = 0$

Relaciones de Nilpotencia

$N_1 : 3\,b_8 + c_4 + 3\,d_5 + 2\,e_1 = 0$

$N_2 : 2\,{b_8}^2 + b_8\,c_4 + 9\,b_8\,d_5 + 3\,c_4\,d_5 + 3\,{d_5}^2 - 3\,b_7\,d_6 - c_3\,d_6 + 6\,b_8\,e_1 + 2\,c_4\,e_1 + 4\,d_5\,e_1 + {e_1}^2 - 3\,b_7\,e_2 - c_3\,e_2 = 0$

$N_3 :$ (demasiado grande ...)

$N_4 :$ (demasiado grande ...)

$N_5 : 2\,{b_8}^2\,{d_5}^3 + b_8\,c_4\,{d_5}^3 - 4\,b_7\,b_8\,{d_5}^2\,d_6 - b_8\,c_3\,{d_5}^2\,d_6 - b_7\,c_4\,{d_5}^2\,d_6 + 2\,{b_7}^2\,d_5\,{d_6}^2 + b_7\,c_3\,d_5\,{d_6}^2 + 4\,{b_8}^2\,{d_5}^2\,e_1 + 2\,b_8\,c_4\,{d_5}^2\,e_1 - 4\,b_7\,b_8\,d_5\,d_6\,e_1 - b_8\,c_3\,d_5\,d_6\,e_1 - b_7\,c_4\,d_5\,d_6\,e_1 + 2\,{b_8}^2\,d_5\,{e_1}^2 + b_8\,c_4\,d_5\,{e_1}^2 - 4\,b_7\,b_8\,{d_5}^2\,e_2 - b_8\,c_3\,{d_5}^2\,e_2 - b_7\,c_4\,{d_5}^2\,e_2 + 4\,{b_7}^2\,d_5\,d_6\,e_2 + 2\,b_7\,c_3\,d_5\,d_6\,e_2 - 4\,b_7\,b_8\,d_5\,e_1\,e_2 - b_8\,c_3\,d_5\,e_1\,e_2 - b_7\,c_4\,d_5\,e_1\,e_2 + 2\,{b_7}^2\,d_5\,{e_2}^2 + b_7\,c_3\,d_5\,{e_2}^2 = 0$

Relaciones de la Suc. Caract. (1)

$S_1 : -2\,{b_8}^2\,d_6 - b_8\,c_4\,d_6 - 2\,b_8\,d_5\,d_6 - c_4\,d_5\,d_6 - {d_5}^2\,d_6 - b_7\,{d_6}^2 - d_5\,d_6\,e_1 - 2\,b_8\,d_5\,e_2 - c_4\,d_5\,e_2 - {d_5}^2\,e_2 - b_7\,d_6\,e_2 - d_5\,e_1\,e_2 = 0$

$S_2 :$ (demasiado grande ...)

$S_3 :$ (demasiado grande ...)

Sucesión Característica (4, 3, 1)

Etapa 1B

9/3/1992

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_4] = X_3$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_5$$
$$[X_2, X_4] = a_4 X_2 + a_3 X_5 + a_1 X_6$$
$$[X_2, X_7] = -(a_4 X_5)$$
$$[X_2, X_8] = a_{12} X_2 + a_{11} X_5 - a_4 X_6$$

$$[X_3, X_4] = b_2 X_2 + a_4 X_3 + b_1 X_5 + a_3 X_6 + a_1 X_7$$
$$[X_3, X_6] = a_4 X_5$$
$$[X_3, X_7] = b_8 X_2 + b_7 X_5$$
$$[X_3, X_8] = b_{10} X_2 + (a_{12} + b_8)\ X_3 + b_9 X_5 + (a_{11} + b_7)\ X_6 - a_4 X_7$$

$$[X_4, X_6] = c_4 X_2 + c_3 X_5 + a_4 X_6$$
$$[X_4, X_7] = c_6 X_2 + (b_8 + c_4)\ X_3 + c_5 X_5 + (b_7 + c_3)\ X_6 + a_4 X_7$$
$$[X_4, X_8] = c_8 X_2 + (b_{10} + c_6)\ X_3 + (a_{12} + 2\,b_8 + c_4)\ X_4 + c_7 X_5 + (b_9 + c_5)\ X_6 + (a_{11} + 2\,b_7 + c_3)\ X_7$$

$$[X_6, X_7] = e_2 X_2 + e_1 X_5$$
$$[X_6, X_8] = e_4 X_2 + e_2 X_3 + e_3 X_5 + e_1 X_6$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + e_2 X_4 + f_1 X_5 + e_3 X_6 + e_1 X_7$$

RELACIONES

R_1: X_5 central $\Leftarrow$ *E1B*

RELACIONES DE JACOBI

$J_1 : a_1 b_8 = 0$
$J_2 : 2 a_4^2 + 2 a_1 a_{12} + a_1 b_8 = 0$
$J_3 : a_1 b_8 + a_1 c_4 - a_1 e_1 = 0$
$J_4 : 2 a_4^2 + 2 a_1 a_{12} + 2 a_1 b_8 + a_1 c_4 - a_1 e_1 = 0$
$J_5 : 2 a_4^2 + 2 a_1 a_{12} + 3 a_1 b_8 + a_1 c_4 - a_1 e_1 = 0$
$J_6 : -(a_1 c_4) + a_1 e_1 = 0$
$J_7 : a_4 b_2 + a_4 b_7 + a_3 b_8 + a_4 c_3 - a_1 c_6 - a_3 e_1 = 0$
$J_8 : -(a_1 e_2) = 0$
$J_9 : a_1 e_2 = 0$
$J_{10} : -3 a_4 e_2 = 0$
$J_{11} : -2 a_4 e_2 = 0$
$J_{12} : -(a_4 e_2) = 0$
$J_{13} : a_4 e_2 = 0$
$J_{14} : a_4 b_8 - a_3 e_2 = 0$
$J_{15} : a_4 b_8 + 2 a_4 c_4 - 2 a_4 e_1 - a_3 e_2 = 0$
$J_{16} : a_4 b_8 + a_3 e_2 = 0$
$J_{17} : b_8^2 + b_8 e_1 + a_{11} e_2 + b_2 e_2 + b_7 e_2 = 0$
$J_{18} : -(a_{12} e_2) + b_8 e_2 - c_4 e_2 + 2 e_1 e_2 = 0$
$J_{19} : -2 a_4 a_{11} + 2 a_3 a_{12} - 2 a_4 b_7 + 2 a_3 b_8 + a_1 b_{10} + a_3 c_4 + a_1 c_6 - a_1 e_3 = 0$
$J_{20} : -2 a_4 a_{11} + 2 a_3 a_{12} + a_4 b_2 - a_4 b_7 + 3 a_3 b_8 + a_1 b_{10} + a_4 c_3 + a_3 c_4 - a_3 e_1 - a_1 e_3 = 0$
$J_{21} : a_4 a_{12} + 2 a_4 b_8 + 2 a_4 c_4 - a_1 e_4 = 0$
$J_{22} : a_4 a_{12} + 3 a_4 b_8 + 2 a_4 c_4 - a_1 e_4 = 0$
$J_{23} : a_4 a_{12} + a_4 b_8 + 2 a_4 e_1 - a_1 e_4 = 0$
$J_{24} : a_4 a_{12} + 2 a_4 b_8 + 2 a_4 c_4 - a_3 e_2 - a_1 e_4 = 0$
$J_{25} : a_4 a_{12} + 3 a_4 b_8 + 2 a_4 c_4 - a_3 e_2 - a_1 e_4 = 0$
$J_{26} : -(a_4 a_{12}) - 2 a_4 e_1 + a_3 e_2 + a_1 e_4 = 0$
$J_{27} : a_4 b_{10} + a_{12} c_3 + 2 b_8 c_3 - a_{11} c_4 + c_3 c_4 + a_4 c_6 - a_{11} e_1 - 2 b_7 e_1 - b_1 e_2 - a_4 e_3 - a_3 e_4 = 0$
$J_{28} : 2 b_8 c_4 + c_4^2 + c_4 e_1 - a_{11} e_2 - b_2 e_2 - 2 b_7 e_2 - c_3 e_2 - 2 a_4 e_4 = 0$
$J_{29} : b_8^2 + 2 b_8 c_4 + c_4^2 + b_8 e_1 + c_4 e_1 - b_7 e_2 - c_3 e_2 - 2 a_4 e_4 = 0$
$J_{30} : 2 e_1^2 - a_{11} e_2 + b_7 e_2 - c_3 e_2 - 2 a_4 e_4 = 0$

J_{31} : $2\,a_{12}\,b_1 - a_{11}\,b_2 + a_{11}\,b_7 + 2\,{b_7}^2 + 3\,b_1\,b_8 + a_3\,b_{10} - a_{11}\,c_3 + b_1\,c_4 + 2\,a_4\,c_5 - a_1\,c_8 - a_3\,e_3 - a_1\,f_1 = 0$

J_{32} : $a_{12}\,b_7 - a_{11}\,b_8 + b_7\,b_8 - a_4\,b_{10} + a_{11}\,e_1 + 2\,b_7\,e_1 + b_1\,e_2 + a_4\,e_3 - a_1\,f_2 = 0$

J_{33} : $a_{12}\,b_2 + a_{11}\,b_8 + 3\,b_2\,b_8 + 2\,b_7\,b_8 + b_8\,c_3 - a_{11}\,c_4 + b_2\,c_4 - b_7\,c_4 + a_4\,c_6 - a_3\,e_4 - a_1\,f_2 = 0$

J_{34} : $a_{12}\,b_7 - a_{11}\,b_8 + b_7\,b_8 + a_{12}\,c_3 + 2\,b_8\,c_3 - a_{11}\,c_4 + c_3\,c_4 + a_4\,c_6 - a_3\,e_4 - a_1\,f_2 = 0$

J_{35} : $-(b_8\,b_9) + b_7\,b_{10} - b_9\,c_4 + a_{12}\,c_5 + 2\,b_8\,c_5 + c_4\,c_5 - a_{11}\,c_6 + b_7\,c_6 - a_4\,c_8 + b_9\,e_1 + 2\,c_5\,e_1 - b_7\,e_3 - b_1\,e_4 - a_4\,f_1 - a_3\,f_2 = 0$

J_{36} : $-(b_{10}\,c_4) + 3\,b_8\,c_6 + c_4\,c_6 + c_6\,e_1 + b_9\,e_2 + c_5\,e_2 + c_4\,e_3 - b_2\,e_4 - b_7\,e_4 - c_3\,e_4 - 2\,a_4\,f_2 = 0$

Relaciones de Nilpotencia

N_1 : $-2\,{a_4}^2 + a_1\,b_8 + 2\,a_1\,c_4 = 0$

N_2 : ${a_4}^4 - a_1\,{a_4}^2\,b_8 - 2\,a_1\,{a_4}^2\,c_4 + {a_1}^2\,b_8\,c_4 + {a_1}^2\,{c_4}^2 = 0$

N_3 : $3\,a_{12} + 3\,b_8 + c_4 + 2\,e_1 = 0$

N_4 : $3\,{a_{12}}^2 + 6\,a_{12}\,b_8 + 2\,{b_8}^2 + 2\,a_{12}\,c_4 + b_8\,c_4 + 6\,a_{12}\,e_1 + 6\,b_8\,e_1 + 2\,c_4\,e_1 + {e_1}^2 - 2\,a_{11}\,e_2 - 3\,b_7\,e_2 - c_3\,e_2 + 2\,a_4\,e_4 = 0$

N_5 : (demasiado grande ...)

N_6 : (demasiado grande ...)

N_7 : (demasiado grande ...)

Relaciones de la Suc. Caract. (1)

S_1 : $a_4\,e_2 = 0$

S_2 : $-{a_{12}}^3 - 3\,{a_{12}}^2\,b_8 - 2\,a_{12}\,{b_8}^2 - {a_{12}}^2\,c_4 - a_{12}\,b_8\,c_4 - 2\,a_{11}\,a_{12}\,e_2 - a_{12}\,b_7\,e_2 - 2\,a_{11}\,b_8\,e_2 - 2\,a_4\,b_{10}\,e_2 - a_{11}\,c_4\,e_2 - a_4\,c_6\,e_2 - a_{11}\,e_1\,e_2 - a_4\,e_2\,e_3 + a_4\,a_{12}\,e_4 + 2\,a_4\,b_8\,e_4 + a_4\,c_4\,e_4 = 0$

S_3 : (demasiado grande ...)

S_4 : (demasiado grande ...)

Sucesión Característica (4, 3, 1)

Etapa 1BA

9/3/1992

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_4] = X_3$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_3] = a_1 X_5$$
$$[X_2, X_4] = a_3 X_5 + a_1 X_6$$
$$[X_2, X_8] = a_{11} X_5$$

$$[X_3, X_4] = b_2 X_2 + b_1 X_5 + a_3 X_6 + a_1 X_7$$
$$[X_3, X_7] = b_7 X_5$$
$$[X_3, X_8] = e_3 X_2 + b_9 X_5 + (a_{11} + b_7) X_6$$

$$[X_4, X_6] = c_3 X_5$$
$$[X_4, X_7] = c_5 X_5 + (b_7 + c_3) X_6$$
$$[X_4, X_8] = c_8 X_2 + e_3 X_3 + c_7 X_5 + (b_9 + c_5) X_6 + (a_{11} + 2 b_7 + c_3) X_7$$

$$[X_6, X_8] = e_3 X_5$$

$$[X_7, X_8] = f_1 X_5 + e_3 X_6$$

RELACIONES

R_1: $a_1 \neq 0 \Leftarrow E1BA$
R_2: $a_{12}^2 -> e_4 a_4 \Leftarrow J, N$
R_3: $a_4^2 -> a_1 a_{12} \Leftarrow J, N$
R_4: X_5 central $\Leftarrow E1B$

JACOBI, NILPOTENCIA Y SC

$G_1 : -(a_{11}\, b_2) + a_{11}\, b_7 + 2\, {b_7}^2 - a_{11}\, c_3 - a_1\, c_8 - a_1\, f_1 = 0$

Sucesión Característica (4, 3, 1)

Etapa 1BB

9/3/1992

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_4] = X_3$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_4] = a_3 X_5$$
$$[X_2, X_8] = a_{11} X_5$$

$$[X_3, X_4] = b_2 X_2 + b_1 X_5 + a_3 X_6$$
$$[X_3, X_7] = b_7 X_5$$
$$[X_3, X_8] = b_{10} X_2 + b_9 X_5 + (a_{11} + b_7) X_6$$

$$[X_4, X_6] = c_3 X_5$$
$$[X_4, X_7] = c_6 X_2 + c_5 X_5 + (b_7 + c_3) X_6$$
$$[X_4, X_8] = c_8 X_2 + (b_{10} + c_6) X_3 + c_7 X_5 + (b_9 + c_5) X_6 + (a_{11} + 2 b_7 + c_3) X_7$$

$$[X_6, X_8] = e_3 X_5$$

$$[X_7, X_8] = f_2 X_2 + f_1 X_5 + e_3 X_6$$

RELACIONES

R$_1$: $a_1 = 0, a_3 \neq 0 \Leftarrow E1BB$
R$_2$: $a_1 = 0 \Leftarrow E1BB$
R$_3$: X_5 central $\Leftarrow E1B$

JACOBI, NILPOTENCIA Y SC

$G_1 : b_7 b_{10}^2 - a_{11} b_{10} c_6 + b_7 b_{10} c_6 - 2 b_7 b_{10} e_3 + a_{11} c_6 e_3 - b_7 c_6 e_3 + b_7 e_3^2 - a_{11} b_2 f_2 + a_{11} b_7 f_2 + 2 b_7^2 f_2 - a_{11} c_3 f_2 = 0$

$G_2 : b_7 b_{10} - a_{11} c_6 + b_7 c_6 - b_7 e_3 - a_3 f_2 = 0$

$G_3 : -(a_{11} b_2) + a_{11} b_7 + 2 b_7^2 + a_3 b_{10} - a_{11} c_3 - a_3 e_3 = 0$

Sucesión Característica (4, 3, 1)

Etapa 1BC

9/3/1992

Ley del Álgebra

$$[X_1, X_3] = X_2$$
$$[X_1, X_4] = X_3$$
$$[X_1, X_6] = X_5$$
$$[X_1, X_7] = X_6$$
$$[X_1, X_8] = X_7$$

$$[X_2, X_8] = a_{12} X_2 + a_{11} X_5$$

$$[X_3, X_4] = b_2 X_2 + b_1 X_5$$
$$[X_3, X_7] = b_8 X_2 + b_7 X_5$$
$$[X_3, X_8] = b_{10} X_2 + (a_{12} + b_8)\ X_3 + b_9 X_5 + (a_{11} + b_7)\ X_6$$

$$[X_4, X_6] = c_4 X_2 + c_3 X_5$$
$$[X_4, X_7] = c_6 X_2 + (b_8 + c_4)\ X_3 + c_5 X_5 + (b_7 + c_3)\ X_6$$
$$[X_4, X_8] = c_8 X_2 + (b_{10} + c_6)\ X_3 + (a_{12} + 2\,b_8 + c_4)\ X_4 + c_7 X_5 + (b_9 + c_5)\ X_6 + (a_{11} + 2\,b_7 + c_3)\ X_7$$

$$[X_6, X_7] = e_2 X_2 + e_1 X_5$$
$$[X_6, X_8] = e_4 X_2 + e_2 X_3 + e_3 X_5 + e_1 X_6$$

$$[X_7, X_8] = f_2 X_2 + e_4 X_3 + e_2 X_4 + f_1 X_5 + e_3 X_6 + e_1 X_7$$

RELACIONES

R$_1$: $a_1 = a_3 = 0 \Leftarrow E1BC$
R$_2$: X_5 central $\Leftarrow E1B$

Relaciones de Jacobi

$J_1 : 0 = 0$
$J_2 : 0 = 0$
$J_3 : 0 = 0$
$J_4 : 0 = 0$
$J_5 : 0 = 0$
$J_6 : 0 = 0$
$J_7 : 0 = 0$
$J_8 : 2\,a_{12}\,b_1 - a_{11}\,b_2 + a_{11}\,b_7 + 2\,{b_7}^2 + 3\,b_1\,b_8 - a_{11}\,c_3 + b_1\,c_4 = 0$
$J_9 : a_{12}\,b_2 + a_{11}\,b_8 + 3\,b_2\,b_8 + 2\,b_7\,b_8 + b_8\,c_3 - a_{11}\,c_4 + b_2\,c_4 - b_7\,c_4 = 0$
$J_{10} : a_{12}\,b_7 - a_{11}\,b_8 + b_7\,b_8 + a_{12}\,c_3 + 2\,b_8\,c_3 - a_{11}\,c_4 + c_3\,c_4 = 0$
$J_{11} : 0 = 0$
$J_{12} : 0 = 0$
$J_{13} : 0 = 0$
$J_{14} : 0 = 0$
$J_{15} : 0 = 0$
$J_{16} : 0 = 0$
$J_{17} : 0 = 0$
$J_{18} : {b_8}^2 + b_8\,e_1 + a_{11}\,e_2 + b_2\,e_2 + b_7\,e_2 = 0$
$J_{19} : -(a_{12}\,e_2) + b_8\,e_2 - c_4\,e_2 + 2\,e_1\,e_2 = 0$
$J_{20} : a_{12}\,c_3 + 2\,b_8\,c_3 - a_{11}\,c_4 + c_3\,c_4 - a_{11}\,e_1 - 2\,b_7\,e_1 - b_1\,e_2 = 0$
$J_{21} : a_{12}\,b_7 - a_{11}\,b_8 + b_7\,b_8 + a_{11}\,e_1 + 2\,b_7\,e_1 + b_1\,e_2 = 0$
$J_{22} : 2\,b_8\,c_4 + {c_4}^2 + c_4\,e_1 - a_{11}\,e_2 - b_2\,e_2 - 2\,b_7\,e_2 - c_3\,e_2 = 0$
$J_{23} : {b_8}^2 + 2\,b_8\,c_4 + {c_4}^2 + b_8\,e_1 + c_4\,e_1 - b_7\,e_2 - c_3\,e_2 = 0$
$J_{24} : 2\,{e_1}^2 - a_{11}\,e_2 + b_7\,e_2 - c_3\,e_2 = 0$
$J_{25} : -(b_8\,b_9) + b_7\,b_{10} - b_9\,c_4 + a_{12}\,c_5 + 2\,b_8\,c_5 + c_4\,c_5 - a_{11}\,c_6 + b_7\,c_6 + b_9\,e_1 + 2\,c_5\,e_1 - b_7\,e_3 - b_1\,e_4 = 0$
$J_{26} : -(b_{10}\,c_4) + 3\,b_8\,c_6 + c_4\,c_6 + c_6\,e_1 + b_9\,e_2 + c_5\,e_2 + c_4\,e_3 - b_2\,e_4 - b_7\,e_4 - c_3\,e_4 = 0$

Relaciones de Nilpotencia

$N_1 : 3\,a_{12} + 3\,b_8 + c_4 + 2\,e_1 = 0$
$N_2 : 3\,{a_{12}}^2 + 6\,a_{12}\,b_8 + 2\,{b_8}^2 + 2\,a_{12}\,c_4 + b_8\,c_4 + 6\,a_{12}\,e_1 + 6\,b_8\,e_1 + 2\,c_4\,e_1 + {e_1}^2 - 2\,a_{11}\,e_2 - 3\,b_7\,e_2 - c_3\,e_2 = 0$
$N_3 : {a_{12}}^3 + 3\,{a_{12}}^2\,b_8 + 2\,a_{12}\,{b_8}^2 + {a_{12}}^2\,c_4 + a_{12}\,b_8\,c_4 + 6\,{a_{12}}^2\,e_1 + 12\,a_{12}\,b_8\,e_1 + 4\,{b_8}^2\,e_1 + 4\,a_{12}\,c_4\,e_1 + 2\,b_8\,c_4\,e_1 + 3\,a_{12}\,{e_1}^2 + 3\,b_8\,{e_1}^2 + c_4\,{e_1}^2 - 4\,a_{11}\,a_{12}\,e_2 - 6\,a_{12}\,b_7\,e_2 - 3\,a_{11}\,b_8\,e_2 - 4\,b_7\,b_8\,e_2 - 2\,a_{12}\,c_3\,e_2 - b_8\,c_3\,e_2 - a_{11}\,c_4\,e_2 - b_7\,c_4\,e_2 - 2\,a_{11}\,e_1\,e_2 - 3\,b_7\,e_1\,e_2 - c_3\,e_1\,e_2 = 0$

N_4 : (demasiado grande ...)

N_5 : $a_{12}{}^3 e_1{}^2 + 3 a_{12}{}^2 b_8 e_1{}^2 + 2 a_{12} b_8{}^2 e_1{}^2 + a_{12}{}^2 c_4 e_1{}^2 + a_{12} b_8 c_4 e_1{}^2 - 2 a_{11} a_{12}{}^2 e_1 e_2 - 3 a_{12}{}^2 b_7 e_1 e_2 - 3 a_{11} a_{12} b_8 e_1 e_2 - 4 a_{12} b_7 b_8 e_1 e_2 - a_{12}{}^2 c_3 e_1 e_2 - a_{12} b_8 c_3 e_1 e_2 - a_{11} a_{12} c_4 e_1 e_2 - a_{12} b_7 c_4 e_1 e_2 + a_{11}{}^2 a_{12} e_2{}^2 + 3 a_{11} a_{12} b_7 e_2{}^2 + 2 a_{12} b_7{}^2 e_2{}^2 + a_{11} a_{12} c_3 e_2{}^2 + a_{12} b_7 c_3 e_2{}^2 = 0$

Relaciones de la Suc. Caract. (1)

S_1 : $-a_{12}{}^3 - 3 a_{12}{}^2 b_8 - 2 a_{12} b_8{}^2 - a_{12}{}^2 c_4 - a_{12} b_8 c_4 - 2 a_{11} a_{12} e_2 - a_{12} b_7 e_2 - 2 a_{11} b_8 e_2 - a_{11} c_4 e_2 - a_{11} e_1 e_2 = 0$

S_2 : (demasiado grande ...)

S_3 : (demasiado grande ...)

Sucesión Característica (3, 3, 1, 1)

Etapa 1

27/2/1992

Ley del Álgebra

$$[x_1, x_4] = x_3$$

$$[x_1, x_5] = x_4$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_4] = c_5\, x_3 + c_4\, x_6$$

$$[x_2, x_5] = c_9\, x_2 + c_8\, x_3 + c_5\, x_4 + c_7\, x_6 + c_4\, x_7$$

$$[x_2, x_6] = c_{11}\, x_3$$

$$[x_2, x_7] = c_{14}\, x_3 + c_{11}\, x_4 + c_{13}\, x_6$$

$$[x_2, x_8] = c_{18}\, x_2 + c_{17}\, x_3 + c_{14}\, x_4 + c_{11}\, x_5 + c_{16}\, x_6 + c_{13}\, x_7$$

$$[x_3, x_5] = d_5\, x_3 + d_4\, x_6$$

$$[x_3, x_7] = d_{10}\, x_6$$

$$[x_3, x_8] = d_{15}\, x_2 + d_{14}\, x_3 + d_{13}\, x_6 + d_{10}\, x_7$$

$$[x_4, x_5] = e_3\, x_2 + e_2\, x_3 + d_5\, x_4 + e_1\, x_6 + d_4\, x_7$$

$$[x_4, x_7] = -(d_{15}\, x_2) + e_8\, x_3 + e_7\, x_6$$

$$[x_4, x_8] = e_{12}\, x_2 + e_{11}\, x_3 + (d_{14} + e_8)\, x_4 + e_{10}\, x_6 + (d_{13} + e_7)\, x_7$$

$$[x_5, x_6] = d_{15}\, x_2 + f_2\, x_3 + e_5\, x_4 + (-d_{13} - 2\, e_7)\, x_6$$

$$[x_5, x_7] = -(e_{12}\, x_2) + f_5\, x_3 + (e_8 + f_2)\, x_4 + f_4\, x_6 + (-d_{13} - e_7)\, x_7$$

$$[x_5, x_8] = f_9\, x_2 + f_8\, x_3 + (e_{11} + f_5)\, x_4 + (d_{14} + 2\, e_8 + f_2)\, x_5 + f_7\, x_6 + (e_{10} + f_4)\, x_7$$

$$[x_6, x_7] = g_2\, x_3$$

$$[x_6, x_8] = g_5\, x_3 + g_2\, x_4 + g_4\, x_6$$

$$[x_7, x_8] = h_3\, x_2 + h_2\, x_3 + g_5\, x_4 + g_2\, x_5 + h_1\, x_6 + g_4\, x_7$$

ADJUNTAS

$$\mathrm{adj}(x_1) = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_2) = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & c_9 & 0 & 0 & c_{18} \\ 0 & 0 & 0 & c_5 & c_8 & c_{11} & c_{14} & c_{17} \\ 0 & 0 & 0 & 0 & c_5 & 0 & c_{11} & c_{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_{11} \\ 0 & 0 & 0 & c_4 & c_7 & 0 & c_{13} & c_{16} \\ 0 & 0 & 0 & 0 & c_4 & 0 & 0 & c_{13} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_3)=\begin{pmatrix} 0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&d_{15}\\ 0&0&0&0&d_5&0&0&d_{14}\\ 0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0\\ 0&0&0&0&d_4&0&d_{10}&d_{13}\\ 0&0&0&0&0&0&0&d_{10}\\ 0&0&0&0&0&0&0&0 \end{pmatrix}$$

$$\mathrm{adj}(x_4)=\begin{pmatrix} 0&0&0&0&0&0&0&0\\ 0&0&0&0&e_3&0&-d_{15}&e_{12}\\ -1&-c_5&0&0&e_2&0&e_8&e_{11}\\ 0&0&0&0&d_5&0&0&d_{14}+e_8\\ 0&0&0&0&0&0&0&0\\ 0&-c_4&0&0&e_1&0&e_7&e_{10}\\ 0&0&0&0&d_4&0&0&d_{13}+e_7\\ 0&0&0&0&0&0&0&0 \end{pmatrix}$$

$$\mathrm{adj}(x_5)=\begin{pmatrix} 0&0&0&0&0&0&0&0\\ 0&-c_9&0&-e_3&0&d_{15}&-e_{12}&f_9\\ 0&-c_8&-d_5&-e_2&0&f_2&f_5&f_8\\ -1&-c_5&0&-d_5&0&e_5&e_8+f_2&e_{11}+f_5\\ 0&0&0&0&0&0&0&d_{14}+2\,e_8+f_2\\ 0&-c_7&-d_4&-e_1&0&-d_{13}-2\,e_7&f_4&f_7\\ 0&-c_4&0&-d_4&0&0&-d_{13}-e_7&e_{10}+f_4\\ 0&0&0&0&0&0&0&0 \end{pmatrix}$$

$$\mathrm{adj}(x_6)=\begin{pmatrix} 0&0&0&0&0&0&0&0\\ 0&0&0&0&-d_{15}&0&0&0\\ 0&-c_{11}&0&0&-f_2&0&g_2&g_5\\ 0&0&0&0&-e_5&0&0&g_2\\ 0&0&0&0&0&0&0&0\\ 0&0&0&0&d_{13}+2\,e_7&0&0&g_4\\ 0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0 \end{pmatrix}$$

$$\mathrm{adj}(x_7)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & d_{15} & e_{12} & 0 & 0 & h_3 \\ 0 & -c_{14} & 0 & -e_8 & -f_5 & -g_2 & 0 & h_2 \\ 0 & -c_{11} & 0 & 0 & -e_8-f_2 & 0 & 0 & g_5 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & g_2 \\ -1 & -c_{13} & -d_{10} & -e_7 & -f_4 & 0 & 0 & h_1 \\ 0 & 0 & 0 & 0 & d_{13}+e_7 & 0 & 0 & g_4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\mathrm{adj}(x_8)=\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -c_{18} & -d_{15} & -e_{12} & -f_9 & 0 & -h_3 & 0 \\ 0 & -c_{17} & -d_{14} & -e_{11} & -f_8 & -g_5 & -h_2 & 0 \\ 0 & -c_{14} & 0 & -d_{14}-e_8 & -e_{11}-f_5 & -g_2 & -g_5 & 0 \\ 0 & -c_{11} & 0 & 0 & -d_{14}-2\,e_8-f_2 & 0 & -g_2 & 0 \\ 0 & -c_{16} & -d_{13} & -e_{10} & -f_7 & -g_4 & -h_1 & 0 \\ -1 & -c_{13} & -d_{10} & -d_{13}-e_7 & -e_{10}-f_4 & 0 & -g_4 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Sucesión Característica (3, 3, 1, 1)

Etapa 2

27/2/1992

Ley del Álgebra

$$[x_1, x_4] = x_3$$

$$[x_1, x_5] = x_4$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_4] = c_5\, x_3 + c_4\, x_6$$

$$[x_2, x_5] = c_9\, x_2 + c_8\, x_3 + c_5\, x_4 + c_7\, x_6 + c_4\, x_7$$

$$[x_2, x_6] = c_{11}\, x_3$$

$$[x_2, x_7] = c_{14}\, x_3 + c_{11}\, x_4 + c_{13}\, x_6$$

$$[x_2, x_8] = c_{18}\, x_2 + c_{17}\, x_3 + c_{14}\, x_4 + c_{11}\, x_5 + c_{16}\, x_6 + c_{13}\, x_7$$

$$[x_3, x_5] = d_5\, x_3 + d_4\, x_6$$

$$[x_3, x_8] = d_{15}\, x_2 + d_{14}\, x_3 + d_{13}\, x_6$$

$$[x_4, x_5] = e_3\, x_2 + e_2\, x_3 + d_5\, x_4 + e_1\, x_6 + d_4\, x_7$$

$$[x_4, x_7] = -(d_{15}\, x_2) + e_8\, x_3 + e_7\, x_6$$

$$[x_4, x_8] = e_{12}\, x_2 + e_{11}\, x_3 + (d_{14} + e_8)\, x_4 + e_{10}\, x_6 + (d_{13} + e_7)\, x_7$$

$$[x_5, x_6] = d_{15}\, x_2 + f_2\, x_3 + (-d_{13} - 2\, e_7)\, x_6$$

$$[x_5, x_7] = -(e_{12}\,x_2) + f_5\,x_3 + (e_8 + f_2)\,x_4 + f_4\,x_6 + (-d_{13} - e_7)\,x_7$$

$$[x_5, x_8] = f_9\,x_2 + f_8\,x_3 + (e_{11} + f_5)\,x_4 + (d_{14} + 2\,e_8 + f_2)\,x_5 + f_7\,x_6 + (e_{10} + f_4)\,x_7$$

$$[x_6, x_7] = g_2\,x_3$$

$$[x_6, x_8] = g_5\,x_3 + g_2\,x_4 + g_4\,x_6$$

$$[x_7, x_8] = h_3\,x_2 + h_2\,x_3 + g_5\,x_4 + g_2\,x_5 + h_1\,x_6 + g_4\,x_7$$

Condiciones de Jacobi

$J_1 : -(c_{11}\,d_4) = 0$

$J_2 : c_{11}\,d_4 = 0$

$J_3 : 0 = 0$

$J_4 : 0 = 0$

$J_5 : 0 = 0$

$J_6 : 0 = 0$

$J_7 : 0 = 0$

$J_8 : 0 = 0$

$J_9 : -(c_{11}\,d_4) = 0$

$J_{10} : -(c_{11}\,d_5) + c_{11}\,d_{13} = 0$

$J_{11} : -(c_4\,d_{15}) = 0$

$J_{12} : 2\,c_4\,d_{15} = 0$

$J_{13} : -(c_{11}\,d_{15}) = 0$

$J_{14} : c_{11}\,d_{15} = 0$

$J_{15} : 0 = 0$

$J_{16}: \; 0 = 0$

$J_{17}: \; c_4\, d_{15} = 0$

$J_{18}: \; -(c_9\, d_{15}) + d_5\, d_{15} + d_{13}\, d_{15} = 0$

$J_{19}: \; -(c_5\, d_{15}) + c_{13}\, d_{15} - c_{11}\, e_3 = 0$

$J_{20}: \; c_5\, d_{15} - c_{13}\, d_{15} + c_{11}\, e_3 = 0$

$J_{21}: \; 0 = 0$

$J_{22}: \; 0 = 0$

$J_{23}: \; 0 = 0$

$J_{24}: \; 0 = 0$

$J_{25}: \; 0 = 0$

$J_{26}: \; c_{11}\, d_4 = 0$

$J_{27}: \; c_4\, c_9 - c_5\, d_4 + c_{13}\, d_4 + c_4\, d_5 - c_4\, d_{13} - 3\, c_4\, e_7 = 0$

$J_{28}: \; -(c_9\, c_{11}) + c_{11}\, d_5 - c_{11}\, d_{13} - c_{11}\, e_7 = 0$

$J_{29}: \; 0 = 0$

$J_{30}: \; c_4\, d_{15} = 0$

$J_{31}: \; -(c_5\, d_{15}) - c_{11}\, e_3 = 0$

$J_{32}: \; c_5\, d_{15} = 0$

$J_{33}: \; -(c_7\, d_{15}) - c_{13}\, e_3 - d_5\, e_7 + {e_7}^2 + d_4\, e_8 + c_4\, e_{12} = 0$

$J_{34}: \; c_9\, d_{15} - d_5\, d_{15} - d_{13}\, d_{15} = 0$

$J_{35}: \; c_5\, c_9 + c_{14}\, d_4 + c_{11}\, e_1 - c_4\, e_8 + c_4\, f_2 = 0$

$J_{36}: \; -(c_9\, c_{13}) + c_{14}\, d_4 + c_{11}\, e_1 - c_5\, e_7 + c_{13}\, e_7 + c_4\, e_8 + c_4\, f_2 = 0$

$J_{37}: \; 0 = 0$

$J_{38}: \; -3\, d_{15}\, g_2 = 0$

$J_{39}: \; 0 = 0$

$J_{40}: \; -(c_9\, c_{11}) - c_4\, g_2 = 0$

$J_{41}: c_{11}\,e_7 - c_4\,g_2 = 0$

$J_{42}: -(c_{11}\,d_5) + c_{11}\,d_{13} + c_{11}\,e_7 - c_4\,g_2 = 0$

$J_{43}: -2\,c_{11}\,d_{13} - 2\,c_{11}\,e_7 + c_4\,g_2 = 0$

$J_{44}: -2\,c_{11}\,d_{13} - 2\,c_{11}\,e_7 + c_4\,g_2 = 0$

$J_{45}: -(c_9\,c_{11}) + c_{11}\,d_5 - c_{11}\,d_{13} - 2\,c_{11}\,e_7 + c_4\,g_2 = 0$

$J_{46}: -(c_9\,c_{14}) + c_{14}\,d_5 - c_{14}\,d_{13} + c_{11}\,e_2 - c_{14}\,e_7 + c_5\,f_2 - c_{13}\,f_2 + c_{11}\,f_4 - c_7\,g_2 = 0$

$J_{47}: -2\,c_{14}\,d_{15} - 2\,c_{11}\,e_{12} + c_9\,g_2 = 0$

$J_{48}: -(c_{11}\,e_3) - d_4\,g_2 = 0$

$J_{49}: -(d_4\,g_2) = 0$

$J_{50}: -(c_{13}\,d_{15}) - d_4\,g_2 = 0$

$J_{51}: -(c_{13}\,d_{15}) - d_4\,g_2 = 0$

$J_{52}: c_5\,d_{15} - d_4\,g_2 = 0$

$J_{53}: c_{13}\,d_{15} + d_4\,g_2 = 0$

$J_{54}: -(c_5\,d_{15}) - c_{11}\,e_3 + d_4\,g_2 = 0$

$J_{55}: c_{13}\,d_{15} + d_4\,g_2 = 0$

$J_{56}: c_{11}\,d_{15} = 0$

$J_{57}: -(c_8\,d_{15}) - c_{14}\,e_3 - d_{13}\,e_8 - e_7\,e_8 + c_5\,e_{12} - e_7\,f_2 - e_1\,g_2 = 0$

$J_{58}: c_{14}\,d_{15} + c_{11}\,e_{12} + d_5\,g_2 - e_7\,g_2 = 0$

$J_{59}: c_{11}\,e_{12} - d_{13}\,g_2 - e_7\,g_2 = 0$

$J_{60}: c_{11}\,e_{12} + d_{13}\,g_2 + e_7\,g_2 = 0$

$J_{61}: -(c_{14}\,d_{15}) - c_{11}\,e_{12} - d_5\,g_2 + 2\,d_{13}\,g_2 + 3\,e_7\,g_2 = 0$

$J_{62}: c_4\,c_{18} - c_5\,d_{13} + c_{13}\,d_{13} + c_4\,d_{14} - c_{11}\,e_1 + c_4\,e_8 - c_4\,g_4 = 0$

$J_{63}: -(c_9\,c_{13}) + c_4\,c_{18} + c_{14}\,d_4 - c_5\,d_{13} + c_{13}\,d_{13} + c_4\,d_{14} - c_5\,e_7 + c_{13}\,e_7 + 2\,c_4\,e_8 + c_4\,f_2 - c_4\,g_4 = 0$

$J_{64}: c_{11}\,c_{18} - c_{11}\,d_{14} + c_{11}\,f_2 + c_5\,g_2 - c_{13}\,g_2 + c_{11}\,g_4 = 0$

$J_{65}: -(d_5\,d_{13}) + {d_{13}}^2 + 2\,d_4\,d_{14} + c_7\,d_{15} + 2\,d_{13}\,e_7 + 2\,d_4\,e_8 + d_4\,f_2 - d_4\,g_4 = 0$

$J_{66}: -(d_5\,d_{13}) + {d_{13}}^2 + 2\,d_4\,d_{14} - c_{13}\,e_3 - d_5\,e_7 + 2\,d_{13}\,e_7 + {e_7}^2 + 3\,d_4\,e_8 + c_4\,e_{12} + d_4\,f_2 - d_4\,g_4 = 0$

$J_{67}: c_{18}\,d_{15} - d_{14}\,d_{15} - 2\,d_{15}\,e_8 + e_3\,g_2 - d_{15}\,g_4 = 0$

$J_{68}: -(c_{18}\,d_{15}) + d_{14}\,d_{15} + 2\,d_{15}\,e_8 - e_3\,g_2 + d_{15}\,g_4 = 0$

$J_{69}: -(c_{14}\,d_{15}) - d_5\,g_2 + d_{13}\,g_2 + 2\,e_7\,g_2 = 0$

$J_{70}: c_5\,c_{18} + c_{14}\,d_{13} - c_{11}\,e_2 + c_{14}\,e_7 + c_5\,e_8 - c_{13}\,e_8 + c_{11}\,e_{10} - c_4\,g_5 = 0$

$J_{71}: -(c_9\,c_{14}) + c_5\,c_{18} + c_{14}\,d_5 + c_5\,e_8 - c_{13}\,e_8 + c_{11}\,e_{10} + c_5\,f_2 - c_{13}\,f_2 + c_{11}\,f_4 - c_7\,g_2 - c_4\,g_5 = 0$

$J_{72}: c_{13}\,c_{18} - c_{14}\,d_{13} + c_{14}\,e_7 - c_{11}\,e_{10} + c_{11}\,f_4 + c_7\,g_2 + c_4\,g_5 = 0$

$J_{73}: d_5\,d_{14} + c_8\,d_{15} + 2\,d_5\,e_8 + d_5\,f_2 - d_{13}\,f_2 - d_4\,g_5 = 0$

$J_{74}: -(d_{13}\,d_{14}) - c_{16}\,d_{15} - 2\,d_{14}\,e_7 - 2\,d_{13}\,e_8 - 4\,e_7\,e_8 - 2\,d_{13}\,f_2 - 2\,e_7\,f_2 - e_1\,g_2 - d_4\,g_5 = 0$

$J_{75}: d_5\,d_{14} - c_{14}\,e_3 + 2\,d_5\,e_8 - d_{13}\,e_8 - e_7\,e_8 + c_5\,e_{12} + d_5\,f_2 - d_{13}\,f_2 - e_7\,f_2 - e_1\,g_2 - d_4\,g_5 = 0$

$J_{76}: c_{14}\,d_{15} + d_5\,g_2 + d_{13}\,g_2 = 0$

$J_{77}: 3\,e_7\,g_2 = 0$

$J_{78}: -(c_{17}\,d_{15}) + 2\,e_8\,f_2 + {f_2}^2 + c_{11}\,f_9 - e_2\,g_2 - e_{10}\,g_2 - f_4\,g_2 + f_2\,g_4 - d_5\,g_5 + d_{13}\,g_5 + 2\,e_7\,g_5 = 0$

$J_{79}: -(c_9\,c_{16}) + c_7\,c_{18} + c_{17}\,d_4 - c_8\,d_{13} + c_{16}\,d_{13} + c_7\,d_{14} + c_{14}\,e_1 + 2\,c_{16}\,e_7 + 2\,c_7\,e_8 - c_5\,e_{10} + c_{13}\,e_{10} + c_4\,e_{11} + c_7\,f_2 + c_4\,f_5 - c_7\,g_4 - c_4\,h_1 = 0$

$J_{80}: c_{14}\,c_{18} - c_{14}\,d_{14} + c_{14}\,e_8 - c_{11}\,e_{11} + c_{11}\,f_5 + c_8\,g_2 + c_{16}\,g_2 + c_{14}\,g_4 + c_5\,g_5 - c_{13}\,g_5 + c_{11}\,h_1 = 0$

$J_{81}: 2\,d_{14}\,e_1 - d_{13}\,e_2 - c_{16}\,e_3 + 3\,e_1\,e_8 - d_5\,e_{10} + d_{13}\,e_{10} + 3\,e_7\,e_{10} + d_4\,e_{11} + c_7\,e_{12} + e_1\,f_2 - d_{13}\,f_4 - c_4\,f_9 - e_1\,g_4 - d_4\,h_1 = 0$

$J_{82}: -(c_9\,c_{17}) + c_8\,c_{18} + c_{17}\,d_5 + c_{14}\,e_2 + 2\,c_8\,e_8 + c_{14}\,e_{10} + c_8\,f_2 - c_{16}\,f_2 + c_{14}\,f_4 + c_5\,f_5 - c_{13}\,f_5 + c_{11}\,f_7 - c_7\,g_5 - c_4\,h_2 = 0$

$J_{83}: d_{14}\,e_2 - c_{17}\,e_3 + 3\,e_2\,e_8 + e_8\,e_{10} + c_8\,e_{12} + e_2\,f_2 - e_{10}\,f_2 + e_8\,f_4 - d_{13}\,f_5 - e_7\,f_5 - c_5\,f_9 - e_1\,g_5 - d_4\,h_2 = 0$

$J_{84}: c_9\,d_{14} - c_8\,d_{15} - c_{16}\,d_{15} + c_{14}\,e_3 + 2\,c_9\,e_8 - c_5\,e_{12} + c_{13}\,e_{12} + c_9\,f_2 - c_4\,h_3 = 0$

$J_{85}: c_{16}\,d_{15} + d_{14}\,e_7 - d_{13}\,e_8 + e_7\,e_8 + c_{13}\,e_{12} + e_1\,g_2 - c_4\,h_3 = 0$

$J_{86}: -(d_{13}\,d_{14}) - d_{14}\,e_7 - 3\,d_{13}\,e_8 - 3\,e_7\,e_8 + c_{13}\,e_{12} - 2\,d_{13}\,f_2 - 2\,e_7\,f_2 - d_4\,g_5 - c_4\,h_3 = 0$

J_{87} : $c_{17}\,d_{15} + {e_8}^2 + c_{14}\,e_{12} + e_2\,g_2 + e_{10}\,g_2 + e_8\,g_4 - e_7\,g_5 - c_5\,h_3 = 0$

J_{88} : ${e_8}^2 + c_{14}\,e_{12} + 2\,e_8\,f_2 + {f_2}^2 + c_{11}\,f_9 - f_4\,g_2 + e_8\,g_4 + f_2\,g_4 - d_5\,g_5 + d_{13}\,g_5 + e_7\,g_5 - c_5\,h_3 = 0$

J_{89} : $-(e_8\,e_{10}) + e_7\,e_{11} + c_{16}\,e_{12} - e_{10}\,f_2 + d_{14}\,f_4 + 2\,e_8\,f_4 + f_2\,f_4 - d_{13}\,f_5 + e_7\,f_5 + c_{13}\,f_9 - e_1\,g_5 - e_7\,h_1 - d_4\,h_2 - c_7\,h_3 = 0$

J_{90} : $c_{17}\,e_{12} - e_{11}\,f_2 + 3\,e_8\,f_5 + f_2\,f_5 + c_{14}\,f_9 + f_7\,g_2 + f_5\,g_4 - e_2\,g_5 - f_4\,g_5 + f_2\,h_1 - d_5\,h_2 + d_{13}\,h_2 + e_7\,h_2 - c_8\,h_3 = 0$

J_{91} : $-(d_{14}\,g_2) + e_8\,g_2 - f_2\,g_2 + 2\,g_2\,g_4 - c_{11}\,h_3 = 0$

J_{92} : $-(d_{15}\,e_2) - c_{18}\,e_3 + 2\,d_{14}\,e_3 + 3\,e_3\,e_8 - 2\,d_{15}\,e_{10} + c_9\,e_{12} - d_5\,e_{12} + d_{13}\,e_{12} + e_7\,e_{12} + e_3\,f_2 - d_{15}\,f_4 - d_4\,h_3 = 0$

J_{93} : $-(d_{15}\,e_{11}) + c_{18}\,e_{12} - d_{14}\,e_{12} - 3\,e_8\,e_{12} - 2\,e_{12}\,f_2 - 2\,d_{15}\,f_5 - e_{12}\,g_4 - e_3\,g_5 + d_{15}\,h_1 - c_9\,h_3 + d_{13}\,h_3 + e_7\,h_3 = 0$

Condiciones de Nilpotencia

N_1 : $c_{11}\,d_{15} = 0$

N_2 : $c_9 + 2\,d_5 + 2\,d_{13} + 3\,e_7 = 0$

N_3 : $2\,c_9\,d_5 + {d_5}^2 + 2\,c_9\,d_{13} + 4\,d_5\,d_{13} + {d_{13}}^2 + c_7\,d_{15} - c_5\,e_3 + 3\,c_9\,e_7 + 6\,d_5\,e_7 + 3\,d_{13}\,e_7 + 2\,{e_7}^2 + d_4\,e_8 - c_4\,e_{12} + 2\,d_4\,f_2 = 0$

N_4 : (demasiado grande ...)

N_5 : (demasiado grande ...)

N_6 : (demasiado grande ...)

N_7 : $c_{18} + 3\,d_{14} + 3\,e_8 + f_2 + 2\,g_4 = 0$

N_8 : $3\,c_{18}\,d_{14} + 3\,{d_{14}}^2 - c_{17}\,d_{15} + 3\,c_{18}\,e_8 + 6\,d_{14}\,e_8 + 2\,{e_8}^2 - c_{14}\,e_{12} + c_{18}\,f_2 + 2\,d_{14}\,f_2 + e_8\,f_2 - c_{11}\,f_9 - 2\,e_{10}\,g_2 - f_4\,g_2 + 2\,c_{18}\,g_4 + 6\,d_{14}\,g_4 + 6\,e_8\,g_4 + 2\,f_2\,g_4 + {g_4}^2 - 2\,d_{13}\,g_5 - e_7\,g_5 - c_{13}\,h_3 = 0$

N_9 : (demasiado grande ...)

N_{10} : (demasiado grande ...)

N_{11} : (demasiado grande ...)

N_{12} : (demasiado grande ...)

Sucesión Característica (3, 3, 1, 1)

Etapa 3

27/2/1992

Ley del Álgebra

$$[x_1, x_4] = x_3$$

$$[x_1, x_5] = x_4$$

$$[x_1, x_7] = x_6$$

$$[x_1, x_8] = x_7$$

$$[x_2, x_4] = c_5\, x_3 + c_4\, x_6$$

$$[x_2, x_5] = c_9\, x_2 + c_8\, x_3 + c_5\, x_4 + c_7\, x_6 + c_4\, x_7$$

$$[x_2, x_7] = c_{14}\, x_3 + c_{13}\, x_6$$

$$[x_2, x_8] = c_{17}\, x_3 + c_{14}\, x_4 + c_{16}\, x_6 + c_{13}\, x_7$$

$$[x_3, x_5] = d_5\, x_3 + d_4\, x_6$$

$$[x_3, x_8] = d_{14}\, x_3 + d_{13}\, x_6$$

$$[x_4, x_5] = e_3\, x_2 + e_2\, x_3 + d_5\, x_4 + e_1\, x_6 + d_4\, x_7$$

$$[x_4, x_7] = e_8\, x_3 + e_7\, x_6$$

$$[x_4, x_8] = e_{12}\, x_2 + e_{11}\, x_3 + (d_{14} + e_8)\, x_4 + e_{10}\, x_6 + (d_{13} + e_7)\, x_7$$

$$[x_5, x_6] = f_2\, x_3 + (-d_{13} - 2\, e_7)\, x_6$$

$$[x_5, x_7] = -(e_{12}\, x_2) + f_5\, x_3 + (e_8 + f_2)\, x_4 + f_4\, x_6 + (-d_{13} - e_7)\, x_7$$

$$[x_5, x_8] = f_9\, x_2 + f_8\, x_3 + (e_{11} + f_5)\, x_4 + (d_{14} + 2\, e_8 + f_2)\, x_5 + f_7\, x_6 + (e_{10} + f_4)\, x_7$$

$$[x_6, x_7] = g_2\, x_3$$

$$[x_6, x_8] = g_5\, x_3 + g_2\, x_4 + g_4\, x_6$$

$$[x_7, x_8] = h_3\, x_2 + h_2\, x_3 + g_5\, x_4 + g_2\, x_5 + h_1\, x_6 + g_4\, x_7$$

Condiciones de Jacobi

$J_1 : 0 = 0$

$J_2 : 0 = 0$

$J_3 : 0 = 0$

$J_4 : 0 = 0$

$J_5 : 0 = 0$

$J_6 : 0 = 0$

$J_7 : 0 = 0$

$J_8 : 0 = 0$

$J_9 : 0 = 0$

$J_{10} : 0 = 0$

$J_{11} : 0 = 0$

$J_{12} : 0 = 0$

$J_{13} : 0 = 0$

$J_{14} : 0 = 0$

$J_{15} : 0 = 0$

$J_{16} : 0 = 0$

$J_{17}: 0 = 0$

$J_{18}: 0 = 0$

$J_{19}: 0 = 0$

$J_{20}: 0 = 0$

$J_{21}: 0 = 0$

$J_{22}: 0 = 0$

$J_{23}: 0 = 0$

$J_{24}: 0 = 0$

$J_{25}: 0 = 0$

$J_{26}: 0 = 0$

$J_{27}: c_4\,c_9 - c_5\,d_4 + c_{13}\,d_4 + c_4\,d_5 - c_4\,d_{13} - 3\,c_4\,e_7 = 0$

$J_{28}: 0 = 0$

$J_{29}: 0 = 0$

$J_{30}: 0 = 0$

$J_{31}: 0 = 0$

$J_{32}: 0 = 0$

$J_{33}: -(c_{13}\,e_3) - d_5\,e_7 + {e_7}^2 + d_4\,e_8 + c_4\,e_{12} = 0$

$J_{34}: 0 = 0$

$J_{35}: c_5\,c_9 + c_{14}\,d_4 - c_4\,e_8 + c_4\,f_2 = 0$

$J_{36}: -(c_9\,c_{13}) + c_{14}\,d_4 - c_5\,e_7 + c_{13}\,e_7 + c_4\,e_8 + c_4\,f_2 = 0$

$J_{37}: 0 = 0$

$J_{38}: 0 = 0$

$J_{39}: 0 = 0$

$J_{40}: -(c_4\,g_2) = 0$

$J_{41}: -(c_4\,g_2) = 0$

$J_{42}: -(c_4\, g_2) = 0$

$J_{43}: c_4\, g_2 = 0$

$J_{44}: c_4\, g_2 = 0$

$J_{45}: c_4\, g_2 = 0$

$J_{46}: -(c_9\, c_{14}) + c_{14}\, d_5 - c_{14}\, d_{13} - c_{14}\, e_7 + c_5\, f_2 - c_{13}\, f_2 - c_7\, g_2 = 0$

$J_{47}: c_9\, g_2 = 0$

$J_{48}: -(d_4\, g_2) = 0$

$J_{49}: -(d_4\, g_2) = 0$

$J_{50}: -(d_4\, g_2) = 0$

$J_{51}: -(d_4\, g_2) = 0$

$J_{52}: -(d_4\, g_2) = 0$

$J_{53}: d_4\, g_2 = 0$

$J_{54}: d_4\, g_2 = 0$

$J_{55}: d_4\, g_2 = 0$

$J_{56}: 0 = 0$

$J_{57}: -(c_{14}\, e_3) - d_{13}\, e_8 - e_7\, e_8 + c_5\, e_{12} - e_7\, f_2 - e_1\, g_2 = 0$

$J_{58}: (d_5 - e_7)\, g_2 = 0$

$J_{59}: -((d_{13} + e_7)\, g_2) = 0$

$J_{60}: (d_{13} + e_7)\, g_2 = 0$

$J_{61}: (-d_5 + 2\, d_{13} + 3\, e_7)\, g_2 = 0$

$J_{62}: -(c_5\, d_{13}) + c_{13}\, d_{13} + c_4\, d_{14} + c_4\, e_8 - c_4\, g_4 = 0$

$J_{63}: -(c_9\, c_{13}) + c_{14}\, d_4 - c_5\, d_{13} + c_{13}\, d_{13} + c_4\, d_{14} - c_5\, e_7 + c_{13}\, e_7 + 2\, c_4\, e_8 + c_4\, f_2 - c_4\, g_4 = 0$

$J_{64}: (c_5 - c_{13})\, g_2 = 0$

$J_{65}: -(d_5\, d_{13}) + {d_{13}}^2 + 2\, d_4\, d_{14} + 2\, d_{13}\, e_7 + 2\, d_4\, e_8 + d_4\, f_2 - d_4\, g_4 = 0$

$J_{66}: -(d_5\, d_{13}) + {d_{13}}^2 + 2\, d_4\, d_{14} - c_{13}\, e_3 - d_5\, e_7 + 2\, d_{13}\, e_7 + {e_7}^2 + 3\, d_4\, e_8 + c_4\, e_{12} + d_4\, f_2 - d_4\, g_4 = 0$

$J_{67}: \; e_3\, g_2 = 0$

$J_{68}: \; -(e_3\, g_2) = 0$

$J_{69}: \; (-d_5 + d_{13} + 2\, e_7)\; g_2 = 0$

$J_{70}: \; c_{14}\, d_{13} + c_{14}\, e_7 + c_5\, e_8 - c_{13}\, e_8 - c_4\, g_5 = 0$

$J_{71}: \; -(c_9\, c_{14}) + c_{14}\, d_5 + c_5\, e_8 - c_{13}\, e_8 + c_5\, f_2 - c_{13}\, f_2 - c_7\, g_2 - c_4\, g_5 = 0$

$J_{72}: \; -(c_{14}\, d_{13}) + c_{14}\, e_7 + c_7\, g_2 + c_4\, g_5 = 0$

$J_{73}: \; d_5\, d_{14} + 2\, d_5\, e_8 + d_5\, f_2 - d_{13}\, f_2 - d_4\, g_5 = 0$

$J_{74}: \; -(d_{13}\, d_{14}) - 2\, d_{14}\, e_7 - 2\, d_{13}\, e_8 - 4\, e_7\, e_8 - 2\, d_{13}\, f_2 - 2\, e_7\, f_2 - e_1\, g_2 - d_4\, g_5 = 0$

$J_{75}: \; d_5\, d_{14} - c_{14}\, e_3 + 2\, d_5\, e_8 - d_{13}\, e_8 - e_7\, e_8 + c_5\, e_{12} + d_5\, f_2 - d_{13}\, f_2 - e_7\, f_2 - e_1\, g_2 - d_4\, g_5 = 0$

$J_{76}: \; (d_5 + d_{13})\; g_2 = 0$

$J_{77}: \; 3\, e_7\, g_2 = 0$

$J_{78}: \; 2\, e_8\, f_2 + {f_2}^2 - e_2\, g_2 - e_{10}\, g_2 - f_4\, g_2 + f_2\, g_4 - d_5\, g_5 + d_{13}\, g_5 + 2\, e_7\, g_5 = 0$

$J_{79}: \; -(c_9\, c_{16}) + c_{17}\, d_4 - c_8\, d_{13} + c_{16}\, d_{13} + c_7\, d_{14} + c_{14}\, e_1 + 2\, c_{16}\, e_7 + 2\, c_7\, e_8 - c_5\, e_{10} + c_{13}\, e_{10} + c_4\, e_{11} + c_7\, f_2 + c_4\, f_5 - c_7\, g_4 - c_4\, h_1 = 0$

$J_{80}: \; -(c_{14}\, d_{14}) + c_{14}\, e_8 + c_8\, g_2 + c_{16}\, g_2 + c_{14}\, g_4 + c_5\, g_5 - c_{13}\, g_5 = 0$

$J_{81}: \; 2\, d_{14}\, e_1 - d_{13}\, e_2 - c_{16}\, e_3 + 3\, e_1\, e_8 - d_5\, e_{10} + d_{13}\, e_{10} + 3\, e_7\, e_{10} + d_4\, e_{11} + c_7\, e_{12} + e_1\, f_2 - d_{13}\, f_4 - c_4\, f_9 - e_1\, g_4 - d_4\, h_1 = 0$

$J_{82}: \; -(c_9\, c_{17}) + c_{17}\, d_5 + c_{14}\, e_2 + 2\, c_8\, e_8 + c_{14}\, e_{10} + c_8\, f_2 - c_{16}\, f_2 + c_{14}\, f_4 + c_5\, f_5 - c_{13}\, f_5 - c_7\, g_5 - c_4\, h_2 = 0$

$J_{83}: \; d_{14}\, e_2 - c_{17}\, e_3 + 3\, e_2\, e_8 + e_8\, e_{10} + c_8\, e_{12} + e_2\, f_2 - e_{10}\, f_2 + e_8\, f_4 - d_{13}\, f_5 - e_7\, f_5 - c_5\, f_9 - e_1\, g_5 - d_4\, h_2 = 0$

$J_{84}: \; c_9\, d_{14} + c_{14}\, e_3 + 2\, c_9\, e_8 - c_5\, e_{12} + c_{13}\, e_{12} + c_9\, f_2 - c_4\, h_3 = 0$

$J_{85}: \; d_{14}\, e_7 - d_{13}\, e_8 + e_7\, e_8 + c_{13}\, e_{12} + e_1\, g_2 - c_4\, h_3 = 0$

$J_{86}: \; -(d_{13}\, d_{14}) - d_{14}\, e_7 - 3\, d_{13}\, e_8 - 3\, e_7\, e_8 + c_{13}\, e_{12} - 2\, d_{13}\, f_2 - 2\, e_7\, f_2 - d_4\, g_5 - c_4\, h_3 = 0$

$J_{87}: \; {e_8}^2 + c_{14}\, e_{12} + e_2\, g_2 + e_{10}\, g_2 + e_8\, g_4 - e_7\, g_5 - c_5\, h_3 = 0$

$J_{88}: \; {e_8}^2 + c_{14}\, e_{12} + 2\, e_8\, f_2 + {f_2}^2 - f_4\, g_2 + e_8\, g_4 + f_2\, g_4 - d_5\, g_5 + d_{13}\, g_5 + e_7\, g_5 - c_5\, h_3 = 0$

$J_{89}: \; -(e_8\, e_{10}) + e_7\, e_{11} + c_{16}\, e_{12} - e_{10}\, f_2 + d_{14}\, f_4 + 2\, e_8\, f_4 + f_2\, f_4 - d_{13}\, f_5 + e_7\, f_5 + c_{13}\, f_9 - e_1\, g_5 - e_7\, h_1 - d_4\, h_2 - c_7\, h_3 = 0$

J_{90} : $c_{17}\,e_{12} - e_{11}\,f_2 + 3\,e_8\,f_5 + f_2\,f_5 + c_{14}\,f_9 + f_7\,g_2 + f_5\,g_4 - e_2\,g_5 - f_4\,g_5 + f_2\,h_1 - d_5\,h_2 + d_{13}\,h_2 + e_7\,h_2 - c_8\,h_3 = 0$

J_{91} : $g_2\,(-d_{14} + e_8 - f_2 + 2\,g_4) = 0$

J_{92} : $2\,d_{14}\,e_3 + 3\,e_3\,e_8 + c_9\,e_{12} - d_5\,e_{12} + d_{13}\,e_{12} + e_7\,e_{12} + e_3\,f_2 - d_4\,h_3 = 0$

J_{93} : $-(d_{14}\,e_{12}) - 3\,e_8\,e_{12} - 2\,e_{12}\,f_2 - e_{12}\,g_4 - e_3\,g_5 - c_9\,h_3 + d_{13}\,h_3 + e_7\,h_3 = 0$

GERARDO VALEIRAS REINA

SOBRE LAS COMPONENTES IRREDUCIBLES DE LA VARIEDA DE LEYES DE ALGEBRA DE LIE NILPOTENTES COMPLEJAS DE DIMENSION 8

Apto "Cum Laude"

5 MAYO 92

El Vocal,

El Doctorado,