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Exercises - Chapter 02

Problem 01

G1 =

$$\begin{pmatrix} s^3 + s & s + 2 \\ s^2 + s + 1 & 1 \end{pmatrix}$$

Max Degrees Summation of G = + (3) + (1) = 4

det{G} =

$$-3s^2 - 2s - 2$$

Det G : 2

Summation : 4

=> 2 != 4 => The given matrix G is Not Column-Reduced

G2 =

$$\begin{pmatrix} (s+1)^2 (s+2)^2 & -(s+1)^2 (s+2) \\ 0 & s+2 \end{pmatrix}$$

Max Degrees Summation of G = + (4) + (3) = 7

det{G} =

$$(s+1)^2 (s+2)^3$$

Det G : 5

Summation : 7

=> 5 != 7 => The given matrix G is Not Column-Reduced

G3 =

$$\begin{pmatrix} s+2 & s+1 & s+3 \\ s(s+1)^2 & s(s^2+s+1) & s(2s+1)(s+1) \\ (s+1)(s+2) & (s+1)^2 & 3(s+1)^2 \end{pmatrix}$$

Max Degrees Summation of G = + (3) + (3) + (3) = 9

det{G} =

$$2s^3 + 2s^2$$

Det G : 3

Summation : 9

=> 3 != 9 => The given matrix G is Not Column-Reduced

G4 =

$$\begin{pmatrix} (s+2)^2 & (s+1)(s-2) \\ (s-1)(s+2) & (s-1)^2(s+3) \end{pmatrix}$$

Max Degrees Summation of G = + (2) + (3) = 5

det{G} =

$$s^5 + 4s^4 + 3s^3 - 8s^2 - 8s + 8$$

Det G : 5

Summation : 5

=> 5 == 5 => The given matrix G is Column-Reduced

G6 =

$$\begin{pmatrix} s+2 & s+1 & s+3 \\ s(s+1)^2 & s(s^2+s+1) & s(2s+1)(s+1) \\ (s+1)(s+2) & (s+1)^2 & 3(s+1)^2 \end{pmatrix}$$

Max Degrees Summation of G = + (3) + (3) + (3) = 9

det{G} =

$$2s^3 + 2s^2$$

Det G : 3

Summation : 9

=> 3 != 9 => The given matrix G is Not Column-Reduced

G8 =

$$\begin{pmatrix} s^2+1 & s(s^2+1) & s(2s^2-s+1) \\ s-1 & s^2+1 & 2s^2-s+1 \\ s^2 & s^3 & 2s^3-2s^2+1 \end{pmatrix}$$

Max Degrees Summation of G = + (2) + (3) + (3) = 8

det{G} =

$$-s^5 - s^2 + s + 1$$

Det G : 5

Summation : 8

=> 5 != 8 => The given matrix G is Not Column-Reduced

G9 =

$$\begin{pmatrix} s & s-1 & s+2 \\ s(s+1) & s^2 & s(s+2) \\ s(s-2) & (s-1)(s-2) & s^2+s-3 \end{pmatrix}$$

Max Degrees Summation of G = + (2) + (2) + (2) = 6

det{G} =

$$s^2 + s$$

Det G : 2

Summation : 6

=> 2 != 6 => The given matrix G is Not Column-Reduced

G10 =

$$\begin{pmatrix} s^2 + 1 & s^2 + 3s + 3 & s^2 + 4s - 2 & s^2 + 3 \\ s - 2 & s - 1 & s + 2 & s - 2 \\ 3s - 1 & 4s + 3 & 2s + 2 & 3s + 2 \\ s(s + 2) & s^2 + 6s + 4 & s^2 + 6s - 1 & s^2 + 2s + 3 \end{pmatrix}$$

Max Degrees Summation of G = + (2) + (2) + (2) + (2) = 8

det{G} =

$$-2s^2 - 2s - 3$$

Det G : 2

Summation : 8

=> 2 != 8 => The given matrix G is Not Column-Reduced

Note: Matrices G5 and G7 were given non-square and Column-Reduction is defined on square matrices. So, Big Mistake by the Author(s) ☺