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Exercises - Chapter 02

Problem 01 – Smith Form

G1 =

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

SmithForm =

$$\begin{pmatrix} 1 & 0 \\ 0 & -3\,s^2-2\,s-2 \end{pmatrix}$$

G2 =

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

SmithForm =

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

G3 =

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

SmithForm =

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

G4 =

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

SmithForm =

$$\begin{pmatrix} 1 & 0 \\ 0 & s^5+4\,s^4+3\,s^3-8\,s^2-8\,s+8 \end{pmatrix}$$

G6 =

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

SmithForm =

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

G8 =

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

SmithForm =

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -s^5-s^2+s+1 \end{pmatrix}$$

G9 =

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

SmithForm =

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & s\,(s+1) \end{pmatrix}$$

G10 =

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

SmithForm =

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -2\,s^2 - 2\,s - 3 \end{pmatrix}$$