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181ENG02/078

$$1) \quad A = \begin{pmatrix} 1 & 3 & 4 \\ 1 & -1 & 2 \\ 3 & 2 & -1 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix}$$

$$C = \begin{pmatrix} 3 & 5 & 1 \\ 5 & 6 & 7 \\ 9 & 5 & 8 \end{pmatrix}$$

1. If $x = \begin{pmatrix} a \\ b \\ c \end{pmatrix}$

then the linear transformation of $A =$

$$T_x \rightarrow A(x) = \begin{pmatrix} 1 & 3 & 4 \\ 1 & -1 & 2 \\ 3 & 2 & -1 \end{pmatrix} \begin{pmatrix} a \\ b \\ c \end{pmatrix}$$

$$\begin{pmatrix} a & 3b & 4c \\ a & -b & 2c \\ 3a & 2b & -c \end{pmatrix}$$

$$2.) \quad B = \begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix} \quad C = \begin{pmatrix} 3 & 5 & 1 \\ 5 & 6 & 7 \\ 9 & 5 & 8 \end{pmatrix}$$

$$B+C = \begin{pmatrix} 1+3 & 4+5 & 7+1 \\ 2+5 & 5+6 & 8+7 \\ 3+9 & 6+5 & 9+8 \end{pmatrix}$$

$$(B+C) = \begin{pmatrix} 4 & 9 & 8 \\ 7 & 11 & 15 \\ 12 & 11 & 17 \end{pmatrix}$$

$$(B+C)^T = \begin{pmatrix} 4 & 7 & 12 \\ 9 & 11 & 11 \\ 8 & 15 & 17 \end{pmatrix}$$

\therefore The Rank of $(B+C)^T = (B+C) =$

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3.) A =

$$\begin{pmatrix} 1 & 3 & 4 \\ 1 & -1 & 2 \\ 3 & 2 & -1 \end{pmatrix}$$

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$$= 0$$

$$= 1 \begin{vmatrix} -1 & 2 & 1 & 2 \\ 2 & -1 & 3 & -1 \\ -3 & -1 & 3 & -1 \end{vmatrix} + 4 \begin{vmatrix} 1 & -1 \\ 3 & 2 \end{vmatrix} - 1 \begin{vmatrix} 1 & 2 \\ 3 & 2 \end{vmatrix} = 0$$

$$1(1-4) - 3(-1-6) + 4(2+3) = 0$$

$$1(-3) - 3(-7) + 4(5) = 6$$

$$-3 + 21 + 20 = 0$$

$$38 \neq 0$$

\therefore A is non singular

$$B = \begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix} = 0$$

$$1 \begin{vmatrix} 5 & 8 \\ 6 & 9 \end{vmatrix} - 4 \begin{vmatrix} 2 & 8 \\ 3 & 9 \end{vmatrix} + 7 \begin{vmatrix} 2 & 5 \\ 3 & 6 \end{vmatrix} = 0$$

$$1(45-48) - 4(18-24) + 7(12-15) = 0$$

$-3 + 24 - 21 = 0$ \therefore The matrix B is singular

$$C = \begin{pmatrix} 3 & 5 & 1 \\ 5 & 6 & 7 \\ 9 & 5 & 8 \end{pmatrix} = 0$$

$$3 \begin{vmatrix} 6 & 7 \\ 5 & 8 \end{vmatrix} - 5 \begin{vmatrix} 5 & 7 \\ 9 & 8 \end{vmatrix} + 1 \begin{vmatrix} 5 & 6 \\ 9 & 5 \end{vmatrix} = 0$$

$$3(48-35) - 5(40-63) + 1(25-54) = 0$$

$$39 + 115 - 29 = 0$$

$$125 \neq 0$$

\therefore C is non singular