

Tutorial 6 (Questions)

Let $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}$,
 $C = \begin{pmatrix} -1 & 0 \\ 1 & 1 \\ 0 & 1 \end{pmatrix}$ and $D = \begin{pmatrix} -3 & -2 & -1 \\ 1 & 2 & 3 \end{pmatrix}$

1. Check if the following calculation can be performed, and if it is, find the answer (Small 'T' means matrix transpose)

- i) $A + C$
- ii) $A - C^T$
- iii) $C^T + 3D$
- iv) BA
- v) BA^T
- vi) BC
- vii) CB
- viii) B^4
- ix) AA^T
- x) $D^T D$

2. Find the determinant of each of the following matrix:

$$B = \begin{bmatrix} 4 & 1 \\ -9 & 5 \end{bmatrix}$$

$$S = \begin{bmatrix} 2 & 3 & 1 \\ 6 & 5 & 3 \\ 1 & 0 & 1 \end{bmatrix}$$

3. Use Cramer's Law to solve the following simultaneous equation:

i) $3x - y = 7$
 $-5x + 4y = -2$

ii) $x + y = 6$
 $x - y = 2$

iii) $x + y + z = 2$
 $x + 2y + z = 6$
 $y + z = 1$

4. Find the inverse of each of the following matrix using minors, cofactors and transpose

i) $\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$

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

iii) $\begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \\ 0 & 1 & 1 \end{pmatrix}$

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