Tutorial 8 – Matrices Part 2

Monday 30 November 2020 10:11

Q1 Transpose of a matrix: rows become cols and cols become rows...

i) $A = \begin{bmatrix} 1 & 6 & 9 \\ 7 & 8 & -12 \\ 3 & 0 & 1 \end{bmatrix} \Rightarrow A^T = \begin{bmatrix} 1 & 7 & 3 \\ 6 & 8 & 0 \\ 9 & -12 & 1 \end{bmatrix}$

Q2 i) $AA^T \Rightarrow$ matrix multiplication – see notes from Tutorial 7.

Q3 Identity matrix I (always denoted using I)

2×2 $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ 1's on the diagonal

Q4 determinant and inverse of a 2×2 matrix

i) $A = \begin{bmatrix} a & b \\ 1 & 2 \\ c & d \\ 0 & -1 \end{bmatrix}$

$A^{-1} = \frac{1}{\det A} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ ← A

$\det A = ad - bc$

$(1)(-1) - (2)(0)$

$\det A = -1 - 0 = -1$

$A^{-1} = \frac{1}{-1} \begin{bmatrix} -1 & -2 \\ 0 & 1 \end{bmatrix}$

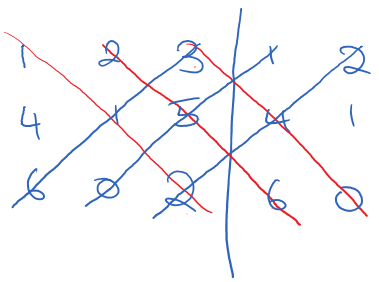
$= \begin{bmatrix} 1 & 2 \\ 0 & -1 \end{bmatrix}$

Q5 determinant of a 3×3:

1) Formula: $\det A = a_{11}C_{11} + a_{12}C_{12} + a_{13}C_{13}$ — cofactors C_{ij}

2) Short cut

$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 1 & 5 \\ 6 & 0 & 2 \end{bmatrix} \Rightarrow$



$$(1\times4\times2)+(2\times5\times6)+(3\times4\times0)$$

$$-$$

$$(2\times4\times2)+(1\times5\times0)+(3\times1\times6)$$

$$\Rightarrow \quad 2+60+0-(16+0+18)$$

$$= \quad 62-34=28$$