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MAT 204

COMPUTER SCIENCE

18/eng02/089

$$A = \begin{pmatrix} 1 & -3 & 6 \\ 4 & 0 & 2 \\ 8 & 5 & 1 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & 1 & 2 \\ 1 & -2 & 1 \\ 0 & 3 & -4 \end{pmatrix} \qquad C = \begin{pmatrix} 0 & 4 & 3 \\ 6 & -7 & 1 \\ 1 & -3 & 2 \end{pmatrix}$$

i. RANK OF A

$$|A| = \begin{pmatrix} 1 & -3 & 6 \\ 4 & 0 & 2 \\ 8 & 5 & 1 \end{pmatrix}$$

$|A| = 1(0 - 10) + 3(4 - 16) + 6(20 - 0)$

$|A| = -10 - 36 + 120 = 74$ IT IS NOT EQUAL TO 0; HENCE THE RANK OF **A** IS **3**

ii. RANK OF B TRANSPOSE

$$|B| = \begin{pmatrix} 1 & 1 & 0 \\ 1 & -2 & 3 \\ 2 & 1 & -4 \end{pmatrix}$$

$|B| = 1(8 + 3) – 1(-4 - 6) + 0(1 + 4)$

$|B| = 5 + 10 + 0 = 15$ IT IS NOT EQUAL TO 0; HENCE THE RANK OF **B TRANSPOSE** IS **3**

iii. RANK OF (A + C) TRANSPOSE

$$|A+C| = \begin{pmatrix} 1 & 1 & 9 \\ 10 & -7 & 3 \\ 9 & 2 & 3 \end{pmatrix}$$

$$|A+C|^T = \begin{pmatrix} 1 & 10 & 9 \\ 1 & -7 & 2 \\ 9 & 3 & 3 \end{pmatrix}$$

$|A+C| = 1(-21 - 6) – 10(3 - 18) + 9(3 + 63)$

$|A+C| = -27 + 150 + 594 = 717$

IT IS NOT EQUAL TO 0; HENCE THE RANK OF **(A + C) TRANSPOSE** IS **3**

iv. RANK OF (B + C)

$$|B+C| = \begin{pmatrix} 1 & 5 & 5 \\ 7 & -9 & 2 \\ 1 & 0 & -2 \end{pmatrix}$$

$|B+C| = 1(18 - 0) -5(-14 -2) + 5(0 + 9)$

$|B+C| = 18 + 80 + 45 = 143$

IT IS NOT EQUAL TO 0; HENCE THE RANK OF (**B + C**) IS **3**

v. RANK OF (A+B+C)

$$|A+B+C| = \begin{pmatrix} 2 & 2 & 11 \\ 11 & -9 & 4 \\ 9 & 5 & -1 \end{pmatrix}$$

$| A+B+C | = 2(9 - 20) – 2(-11 - 36) + 11(55 + 81)$

$| A+B+C | = -22 + 94 + 1496 = 1568$

IT IS NOT EQUAL TO 0; HENCE THE RANK OF (**A+B + C**) IS **3**