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Rank of a Matrix

Tranformation of a Matrix

(I) By Interchanging of any two rows or Two columns of a matrix.

$\Rightarrow C_{ij}$ or R_{ij}

e.g $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \\ 6 & 5 \end{bmatrix}$

Applying C_{12}, $A \sim \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$

R_{23}, $A \sim \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$

(II) By Multiplication of all elements of any row or column by a non-zero number

$\Rightarrow KC_i$ or $C_i(K)$

KR_i or $R_i(K)$

e.g. $A = \begin{bmatrix} 3 & 5 \\ 4 & 6 \\ 7 & 8 \end{bmatrix}$

Applying $2C_1$, $A \sim \begin{bmatrix} 6 & 5 \\ 8 & 6 \\ 14 & 8 \end{bmatrix}$ $(2C_1)$

$3R_3$, $A \sim \begin{bmatrix} 3 & 5 \\ 4 & 6 \\ 21 & 24 \end{bmatrix}$ $(3R_3)$

(III) By Addition of all element of a matrix, the same multiplication of the corresponding elements of any row or Column.

(2) $\Rightarrow R_i + KR_j$ or $R_{ij}(K)$
stands for addition of K-times the jth row of a matrix to the ith row.
similarly, $C_i + KC_j$ or $C_{ij}(K)$

e.g. $A = \begin{bmatrix} 3 & 5 \\ 4 & 6 \\ 7 & 9 \end{bmatrix}$

Applying, $R_1 + 2R_2$

$A \sim \begin{bmatrix} 11 & 17 \\ 4 & 6 \\ 7 & 9 \end{bmatrix}$

and $C_1 + 3C_2$,

$A = \begin{bmatrix} 18 & 5 \\ 22 & 6 \\ 34 & 9 \end{bmatrix}$

and so on —