1.2 Row Echelon form (R.E.F)

Definition:

A matrix is said to be in Row Echelon form If :-

(1) If the first non-zero entry in row is (1).

(2) If row (k) doesn't consist entirely of zeros, the number of leading zeros in row (k+1) is greater than number of leading zeros in row (k).

(3) If there are rows whose entries are all zero, put them below all rows.

ex Determine If the following matrices are in row echelon form (REF).

(1) $\begin{bmatrix} 1 & 2 & 4 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$ ✓ R.E.F

(2) $\begin{bmatrix} \boxed{1} & 2 & 3 \\ 0 & 0 & \boxed{1} \\ 0 & 0 & 0 \end{bmatrix}$ ✓ R.E.F

(3) $\begin{bmatrix} \boxed{1} & 3 & 1 & 0 \\ 0 & 0 & \boxed{1} & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ ✓ R.E.F

(4) $\begin{bmatrix} \boxed{2} & 4 & 6 \\ 0 & \boxed{3} & 5 \\ 0 & 0 & \boxed{4} \end{bmatrix}$ ✗ not R.E.F

(5) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & \boxed{1} & 0 \end{bmatrix}$ ✗ not R.E.F

(6) $\begin{bmatrix} 0 & \boxed{1} & 0 \\ 0 & 0 & 0 \end{bmatrix}$ ✓ R.E.F

(7) $\begin{bmatrix} \boxed{0} & 1 \\ 1 & 0 \end{bmatrix}$ ✗ not R.E.F

Def:
Gaussian elimination.

The process of using Row operations I, II, III to transform a linear System into one whose augmented matrix is in rowechelon form.