A system of equations $Ax+By=0$ is called a homogeneous system if $B \neq 0$.

i.e. if $B \neq O$, it is called a non-homogeneous system of equations.

e.g.,

$$2x+5y=0$$

(When B=0, it is called Homegeneous Equation)

Solution of Non-homogeneous system of linear equations

(i) **Matrix method :** If

$$AX=B$$

, then

$$X=A^{-1}B$$

gives a unique solution, provided *A* is non-singular.

But if *A* is a singular matrix *i.e.,* if

$$|A|=0$$

, then the system of equation

$$AX=B$$

may be consistent with infinitely many solutions or it may be inconsistent.

(ii) Rank method for solution of Non-Homogeneous system

$$AX=B$$

(a) Write down *A*, *B*

(b) Write the augmented matrix

$$[A:B]$$

(c) Reduce the augmented matrix to Echelon form by using elementary row operations.

(d) Find the number of non-zero rows in *A* and

$$[A:B]$$

to find the ranks of *A* and

$$[A:B]$$

respectively.

(e) If

$$\rho(A)\neq\rho(A:B),$$

then the system is inconsistent.

(f)

$$\rho(A)=\rho(A:B)=$$

the number of unknowns, then the system has a unique solution.

If

$$\rho(A)=\rho(A:B)<$$

number of unknowns, then the system has an infinite number of solutions.