Conditions

Solve the set of linear equations by the matrix method : a+3b+2c=3 , 2a-b-3c= -8, 5a+2b+c=9. Solve for a and b

Solution

$$\begin{cases} a+3b+2c=3 \\ 2a-b-3c=-8 \\ 5a+2b+c=9 \end{cases}$$

Let's construct the coefficient matrix of this system:

$$\begin{pmatrix} 1 & 3 & 2 & 3 \\ 2 & -1 & -3 & -8 \\ 5 & 2 & 1 & 9 \end{pmatrix}$$

Now reduce the matrix to echelon form:

$$\begin{pmatrix} 1 & 3 & 2 & 3 \\ 2 & -1 & -3 & -8 \\ 5 & 2 & 1 & 9 \end{pmatrix} \sim \begin{pmatrix} 1 & 3 & 2 & 3 \\ 0 & -7 & -7 & -14 \\ 0 & -13 & -9 & -6 \end{pmatrix} \sim \begin{pmatrix} 1 & 3 & 2 & 3 \\ 0 & -1 & -1 & -2 \\ 0 & -13 & -9 & -6 \end{pmatrix} \sim$$

$$\sim \begin{pmatrix} 1 & 3 & 2 & 3 \\ 0 & -1 & -1 & -2 \\ 0 & 0 & 4 & 20 \end{pmatrix}$$

We've got a system:

$$\begin{cases} a+3b+2c=3 \\ -b-c=-2 \\ 4c=20 \end{cases}$$

Now we can see, that

$$c=5$$

$$b=2-c=-3$$

$$a=3-3b-2c=3+9-10=2$$

Answer:

$$\boldsymbol{a=2}$$

$$\boldsymbol{b=-3}$$

$$\boldsymbol{c=5}$$