403.0

1. Consider the system of 2x2 equations x + 2y = 5 and 3x - 5y = -7. Solve the system of equations using inverse of a matrix.

Answer:

$$x + 2y = 5$$
$$3x - 5y = -7$$

$$\begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -7 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -7 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}^{-1}_{2\times 2} \begin{bmatrix} 5 \\ -7 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}, \quad |A| = -5 - 6 = -11$$

$$Cof(A) = \begin{bmatrix} -5 & -3 \\ -2 & 1 \end{bmatrix} \quad adj(A) = \begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|} adj(A) = \frac{1}{-11} \begin{bmatrix} -5 & -2 \\ -3 & +1 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{-1}{11} \begin{bmatrix} +5 & 2 \\ 3 & -1 \end{bmatrix} \begin{bmatrix} 5 \\ -7 \end{bmatrix}$$

$$= \begin{bmatrix} \cdot 25 - 14 \\ 15 + 8 \end{bmatrix} = \begin{bmatrix} -\frac{11}{3} \\ 23 \end{bmatrix}$$

$$-11 + 2(23)$$
$$11$$

$$\begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -7 \end{bmatrix}, \quad |A| = -5 - 6 = -11$$

$$adj(A) = \begin{bmatrix} -5 \\ \end{bmatrix}$$
Cof