

401.0

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:

$$\begin{array}{rcl} x + 2y = 5 & \times 3 & \Rightarrow \\ 3x - 5y = -7 & & \end{array} \Rightarrow \begin{array}{r} 3x + 6y = 15 \\ 3x - 5y = -7 \\ \hline 11y = 22 \end{array}$$

$$\boxed{y = 2}$$

$$x + 2(2) = 5$$

$$\boxed{x = 1}$$

~~$$\begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$$~~

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

$$\boxed{\therefore x = A^{-1} \times b}$$

$$\det(A) = -5 - 6 = -11$$

$$\text{Adjoint}(A) = \begin{bmatrix} -5 & -3 \\ -2 & 1 \end{bmatrix}$$

$$\therefore A^{-1} = \frac{1}{\det(A)} \times (\text{Adjoint of } A)$$

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

$$\therefore \boxed{x = \frac{4}{11}}$$

$$\boxed{y = \frac{3}{11}}$$

$$\therefore x = \begin{bmatrix} \frac{-5}{-11} & \frac{-3}{-11} \end{bmatrix} \times \begin{bmatrix} 5 \\ -7 \end{bmatrix} \Rightarrow \begin{bmatrix} \frac{25}{11} - \frac{21}{11} \\ \frac{10}{11} - \frac{7}{11} \end{bmatrix} = \begin{bmatrix} \frac{4}{11} \\ \frac{3}{11} \end{bmatrix}$$