404.0

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:

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

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

Method 1: on inspection

$x = 1$ & $y = 2$

Inverse method:

$$Ax = b$$
$$x = A^{-1}b$$

$$A^{-1} = \frac{1}{-5-6}\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} 5/11 & 2/11 \\ 3/11 & -1/11 \end{bmatrix}$$

$$\therefore x = \begin{bmatrix} 5/11 & 2/11 \\ 3/11 & -1/11 \end{bmatrix} \begin{bmatrix} 5 \\ -7 \end{bmatrix}$$

$$= \begin{bmatrix} 25/11 - 14/11 \\ 15/11 + 7/11 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \therefore$$