

6-3-1 Solving Systems of Equations w/ Matrices

Solve the system:

$$\begin{aligned} 2x - 3y &= -1 \\ -3x + 5y &= 3 \end{aligned}$$

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

Coefficient
Matrix

matrix of
variables

matrix of
constants

$$A X = B$$

$$\underbrace{A^{-1}A}_{[I]} X = A^{-1}B \quad \text{multiply by } A^{-1}$$

$$[I] \boxed{X = A^{-1}B}$$

$$\rightarrow \det(A) = 10 - 9 = 1$$

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

$$A^{-1}B = \begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} -1 \\ 3 \end{bmatrix} = \begin{bmatrix} -5+9 \\ -3+6 \end{bmatrix} \quad \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$$

$$\boxed{(4, 3)}$$

(coordinate point)

square system:
same number of
equations & variables

① Rewrite in Matrix Form.

(make sure variables
line up vertically)

② find A^{-1} .

(in verse of coeff matrix)

③ multiply $A^{-1}B$