Algebra 2   3.8
Find the inverse of a 2x2 matrix
Write and solve matrix equations
identity matrix
inverse matrix
matrix equation
coefficient matrix
variable matrix
constant matrix
whiteboards
Wife Swap

$$\frac{1}{det}\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$\begin{bmatrix} 2 & 3 \\ 0 & -5 \end{bmatrix} \quad \begin{matrix} 0 \\ -10-0 \\ -10 \end{matrix} \qquad -\frac{1}{10}\begin{bmatrix} -5 & -3 \\ 0 & 2 \end{bmatrix}$$

Use a matrix equation to solve each system of equations.

9. $-2x + y = 9$
$x + y = 3$

10. $4x - 2y = 22$
$6x + 9y = -3$

coefficient matrix
variable matrix
constant matrix

Graphing calculators

$$A \quad B$$

$$\begin{bmatrix} -2 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = A^{-1} \cdot B$$

$$= -\frac{1}{3} \begin{bmatrix} 1 & -1 \\ -1 & -2 \end{bmatrix} \cdot \begin{bmatrix} 9 \\ 3 \end{bmatrix}$$

$$= \begin{bmatrix} -\frac{1}{3} & \frac{1}{3} \\ \frac{1}{3} & \frac{2}{3} \end{bmatrix} \cdot \begin{bmatrix} 9 \\ 3 \end{bmatrix} = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$$
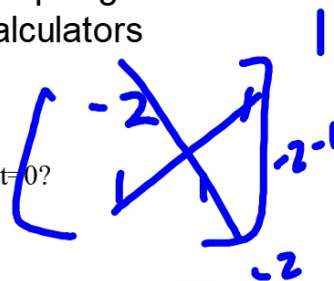
$2 \times 2 \qquad 2 \times 1$

What does it mean if det = 0?

$$\begin{bmatrix} -2 & 1 \\ 1 & 1 \end{bmatrix} \begin{matrix} 1 \\ -2-1 \\ -2 \end{matrix}$$

27. $-x + y = 4$
$-x + y = -4$

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

$-3 + 1$

$3 + 2$

$$4x - 2y = 22$$
$$6x + 9y = -3$$

$$A^{-1} \cdot B =$$

A

$$\begin{bmatrix} 4 & -2 \\ 6 & 9 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 22 \\ -3 \end{bmatrix}$$ B

$36 + 12$

$$A^{-1} = \frac{1}{48} \begin{bmatrix} 9 & 2 \\ -6 & 4 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} \frac{9}{48} & \frac{2}{48} \\ \frac{-6}{48} & \frac{4}{48} \end{bmatrix} = \begin{bmatrix} \frac{3}{16} & \frac{1}{24} \\ \frac{-1}{8} & \frac{1}{12} \end{bmatrix}$$

$A^{-1} \cdot B$

$$\begin{bmatrix} \frac{3}{16} & \frac{1}{24} \\ \frac{-1}{8} & \frac{1}{12} \end{bmatrix} \cdot \begin{bmatrix} 22 \\ -3 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ -3 \end{bmatrix}$$

11. $-2x + y = -4$
$3x + y = 1$

$$A$$

$$B$$

$$\begin{bmatrix} -2 & 1 \\ 3 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -4 \\ 1 \end{bmatrix}$$

$$A^{-1} \cdot B$$

equations:
3x3 using inverse matrix
Whiteboards

39. $2a - b + 4c = 6$
$a + 5b - 2c = -6$
$3a - 2b + 6c = 8$

C
$$\begin{bmatrix} 2 & -1 & 4 \\ 1 & 5 & -2 \\ 3 & -2 & 6 \end{bmatrix}$$
3×3

D
$$\cdot \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 6 \\ -6 \\ 8 \end{bmatrix}$$
3×1

$$[C]^{-1} \cdot [D] = \begin{bmatrix} -6 \\ 2 \\ 5 \end{bmatrix}$$

$$[D] \cdot [C]^{-1}$$

(-6,2,5)

40. $3x - 5y + 2z = 22$
$2x + 3y - z = -9$
$4x + 3y + 3z = 1$

WB prac

3.8

1-13

$(1,-3,2)$

41. $2q + r + s = 2$
$-q - r + 2s = 7$
$-3q + 2r + 3s = 7$

(0,-1,3)