

Bell Ringer

Tuesday 2/11

1. Write the equation to find the determinant of any given matrix

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$
$$a \cdot d - c \cdot b$$

2. Find $\det(B)$

$$B = \begin{bmatrix} 1 & -5 \\ 2 & 3 \end{bmatrix}$$
$$3 - (-10)$$
$$\boxed{13}$$

Solving Systems using Matrices

$$\begin{cases} 3x+y=5 \\ 2x-y=0 \end{cases}$$

$$\begin{cases} -6x + 2y = 6 \\ 4x - 3y = -1 \end{cases}$$

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

$$X = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$B = \begin{bmatrix} 5 \\ 0 \end{bmatrix}$$

We can rewrite our system using a matrix

$$\Rightarrow \begin{bmatrix} 3 & 1 \\ 2 & -1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 0 \end{bmatrix}$$

A
X
=
B

Coefficients
Variables
Constants

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

Then use the equation $AX=B$ to solve our system

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

Solve the system using matrices ~~$A^{-1}AX = A^{-1}B$~~

$$2x - 3y = -1$$

$$y - x = 1$$

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

$A \quad X \quad B$

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

$x=4, y=3$

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

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

$$\begin{matrix} 1 + 3 \\ 1 + 2 \end{matrix} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$$

Solve the system using matrices

$$y = -3x + 5$$

$$3x + y = 5$$

$$5x - 4y = -3$$

$$5x - 4y = -3$$

$$\begin{bmatrix} 3 & 1 \\ 5 & -4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$$

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

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

$$K \cdot B$$

$$X = \begin{bmatrix} -\frac{23}{17} \\ 2 \end{bmatrix}$$

$$x = -\frac{23}{17}$$

$$y = 2$$

$$-12 - 5 = -17$$

$$A^{-1} = \frac{1}{-17} \begin{bmatrix} -4 & -1 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} \frac{4}{17} & \frac{1}{17} \\ -\frac{5}{17} & -\frac{3}{17} \end{bmatrix}$$

$$\begin{bmatrix} \frac{4}{17} & \frac{1}{17} \\ -\frac{5}{17} & -\frac{3}{17} \end{bmatrix} \cdot \begin{bmatrix} 5 \\ -3 \end{bmatrix} = \begin{bmatrix} \frac{-20}{17} + \frac{-3}{17} \\ \frac{25}{17} + \frac{9}{17} \end{bmatrix}$$

Solve the system using matrices

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

$$-3x + 6y = -12$$

$$5a-9b+2c=34$$

$$6a-3b-7c=-25$$

$$a-4b+6c=46$$

Matrices on the Calculator

$$-4x+3y+7z=25$$

$$2x-y+6z=17$$

$$-8x-5y+3z=-5$$

Solve the system using matrices

$$-7x - 2y = -13$$

$$x - 2y = 11$$

Solve the system using matrices

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

$$3x - 8y = 24$$

Due Thursday

Solving Systems of Equations using Matrices

Date _____

Solve each system by elimination using matrices.

1) $-7x - 6y = -20$
 $-10x - y = -21$

2) $-18x + 7y = 17$
 $9x + 2y = 19$

$$\begin{bmatrix} -7 & -6 \\ -10 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -20 \\ -21 \end{bmatrix}$$

$$\begin{bmatrix} -1 & -6 \\ 10 & -7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -20 \\ -21 \end{bmatrix}$$

3) $-4x + 6y = -30$
 $-x + 2y = -12$

$$\begin{bmatrix} -4 & 6 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -30 \\ -12 \end{bmatrix}$$

$$\begin{bmatrix} -4 & 6 \\ -1 & 2 \end{bmatrix} \cdot \begin{bmatrix} -20 \\ -21 \end{bmatrix} = \begin{bmatrix} -20 + 126 \\ 200 - 147 \end{bmatrix}$$

$$\begin{bmatrix} 100 \\ 53 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$$

5) $x - 10y = -3$
 $7x - 5y = -21$

6) $4x + 3y = 17$
 $-8x - y = 1$

7) $2x + 14y = 26$
 $-6x + 7y = -29$

8) $9x + 5y = -11$
 $x + 2y = -7$

$$\begin{aligned} 9) \quad & 2x - 6y = 20 \\ & 8x - 9y = 5 \end{aligned}$$

$$\begin{aligned} 10) \quad & 3x + 3y = 6 \\ & -12x + 6y = -6 \end{aligned}$$

$$\begin{aligned} 11) \quad & -4r + 6s + 4t = 28 \\ & 3r - 2s - 4t = -21 \\ & -4r - 2s + 5t = 17 \end{aligned}$$

$$\begin{aligned} 12) \quad & -4x + 6y + 4z = -24 \\ & 2y + 2z = -6 \\ & 3x - 2y + 2z = 8 \end{aligned}$$

$$\begin{aligned} 13) \quad & -3x + 2y + 6z = -15 \\ & -2x - 4y - 6z = -10 \\ & 4x - 3y + 5z = 20 \end{aligned}$$

$$\begin{aligned} 14) \quad & -3a - 5b + 5c = 30 \\ & -2a + 5b + 2c = -26 \\ & a - 5b + 6c = 7 \end{aligned}$$

$$\begin{aligned} 15) \quad & -5x - y - 4z = 11 \\ & -2x - 6y - 4z = -18 \\ & -2x + 6y + z = 30 \end{aligned}$$

$$\begin{aligned} 16) \quad & 6r - 3s - 3t = 30 \\ & 6r + 5s + 2t = -16 \\ & 3r - 5s - t = 19 \end{aligned}$$

