

Pre-Calculus I
Matrix Review

Name _____

1. Find the determinant of the following matrix

a. $\begin{vmatrix} 2 & -6 \\ 8 & -1 \end{vmatrix}$

46

b. $\begin{vmatrix} -6 & -4 & 0 \\ 5 & 1 & -4 \\ 0 & -2 & 3 \end{vmatrix}$ Use the diagonal method

90

c. $\begin{vmatrix} 3 & -2 & 1 \\ 7 & -1 & -2 \\ 0 & -3 & 2 \end{vmatrix}$ Expand out by minors of the first row.

-17

2. Solve using Cramer's rule to solve the following systems.

a. $\begin{cases} 6x - y = -1 \\ -8x + 3y = 10 \end{cases}$

$D = 10$

$x = \frac{7}{10} = .7$

$D_x = 7$

$y = \frac{52}{10} = \frac{26}{5} = 5.2$

$D_y = 52$

b. $\begin{cases} x + y + 2z = 7 \\ 3y - 2z = 17 \\ 4x - 5y + z = -10 \end{cases}$

$D = -39$

$x = 4$

$D_x = -756$

$y = 5$

$D_y = 795$

$z = -1$

$D_z = 39$

3. Solve for Matrix X.

a. $\begin{bmatrix} 7 & -9 \\ -4 & 5 \end{bmatrix} X + \begin{bmatrix} 0 & -5 \\ 4 & -2 \end{bmatrix} = \begin{bmatrix} -3 & 9 \\ 3 & -6 \end{bmatrix}$

$$X = \begin{bmatrix} 24 & -34 \\ 19 & -28 \end{bmatrix}$$

b. $2X - \begin{bmatrix} 4 & 0 & 2 \\ -1 & 7 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 8 & 2 \\ -4 & -9 & -5 \end{bmatrix}$

$$X = \begin{bmatrix} 5/2 & 4 & 2 \\ -5/2 & -1 & -4 \end{bmatrix}$$

4. Solve for a, b, and c.

$$\begin{bmatrix} 3 & a+5 \\ -2 & -8 \end{bmatrix} + \begin{bmatrix} -4 & -9 \\ b-4 & 12 \end{bmatrix} = \begin{bmatrix} -1 & -10 \\ 9 & 2c \end{bmatrix}$$

$$a = -6$$

$$b = 15$$

$$c = 2$$

5. Give an example of a 2 X 2 matrix (where each entry is a different number) that does not have an inverse.

$$\begin{bmatrix} 2 & 8 \\ 1 & 4 \end{bmatrix}$$

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

6. If $A = \begin{bmatrix} 0 & -1 \\ -1 & 4 \\ 2 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 4 & -3 \\ 0 & -1 & 5 \end{bmatrix}$ $C = \begin{bmatrix} -1 & -2 \\ 3 & 8 \end{bmatrix}$, find

a. AC (Do this without a calculator)

$$\begin{bmatrix} -3 & -8 \\ 13 & 34 \\ 7 & 20 \end{bmatrix}$$

b. $A' + 4B$

$$\begin{bmatrix} -8 & 15 & -10 \\ -1 & 0 & 23 \end{bmatrix}$$

c. $2BA - C$ (Do this without a calculator)

$$\begin{bmatrix} -19 & 12 \\ 19 & 14 \end{bmatrix}$$

d. C^{-1}

$$\begin{bmatrix} -4 & -1 \\ \frac{3}{2} & \frac{1}{2} \end{bmatrix}$$

7. Find the value of x if $\begin{vmatrix} 2x & 4x \\ 5 & -1 \end{vmatrix} = -40$

$$x = \frac{20}{11}$$

8. A dog breeder finds that certain brands of dog food contain different amounts of three main nutrients, measured in milligrams per serving as shown in matrix N. The dog breeder decides to mix the brands in order to give the healthiest feeding mixture possible. Matrix P gives the portion of the mixture for each brand.

		<i>Brands</i>					
		<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>		
<i>nutrient1</i>	[	250	480	360	200	]	= N
<i>nutrient2</i>	[	320	510	475	315]	
<i>nutrient3</i>	[	180	200	230	155]	

		<i>part of mixture</i>	
<i>W</i>	[	40%]
<i>X</i>	[	10%]
<i>Y</i>	[	15%]
<i>Z</i>	[	35%]

= P

Which matrix is defined, NP or PN? Find this matrix. What does this matrix represent?

$$\begin{bmatrix} 272 \\ 360.5 \\ 180.75 \end{bmatrix}$$

The number of milligrams of each nutrient per serving in the mixture.

How many milligrams of nutrient 2 are in a serving of this mixture?

$$360.5 \text{ mg}$$

9. Find the value of x in the following matrix if the determinant is equal to 19:

$$\begin{bmatrix} -1 & 5 & 1 \\ 0 & 3 & 10 \\ 0 & x & 7 \end{bmatrix}$$

$$x = 4$$

10. Solve for x : $\begin{bmatrix} 10 & -14 \\ 22 & -30 \end{bmatrix} \cdot \begin{bmatrix} x & 8 \\ 6 & 4 \end{bmatrix} = \begin{bmatrix} 36 & 24 \\ 84 & 56 \end{bmatrix}$

$$x = 12$$