Name:_____ PCH: Cramer's Rule

Do Now:

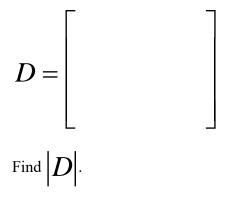
1. Find
$$\begin{vmatrix} c & a & t \\ d & o & g \\ e & m & u \end{vmatrix}$$

2.
$$\begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} \cdot \begin{bmatrix} g & h \\ i & j \\ k & l \end{bmatrix}$$

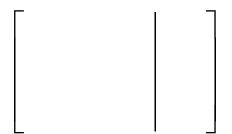
3. Solve the systems of equations algebraically:

$$-4x-6z = -12$$
$$-6x-4y-2z = 6$$
$$-x+2y+z = 9$$

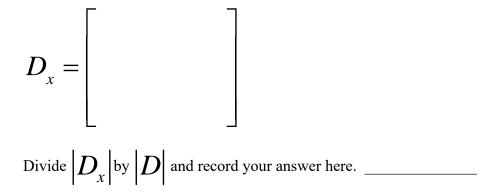
Date:_____ Ms. Loughran Let's take the coefficient matrix of the system of equations in Do Now 3.



Now, let's take the **augmented matrix** of the system of equations given to you in Do Now 3



Replace the **first** column of D with the last column of the augmented matrix given above.



What do you notice? How can we find the other values of y and z?

Cramer's rule to solve systems of linear equations

Steps:

- 1. Set up a coefficient matrix.
- 2. Find the determinant of the coefficient matrix. If the determinant $\neq 0$ you can use Cramer's Rule.
- 3. To find *x* value, replace first column (*x* column) with the answer column and find determinant. Now divide this determinant by the original matrix's determinant, this quotient is your *x* value.
- 4. To solve for *y* value, replace second column (*y* column) with the answer column and find the determinant. Now divide this determinant by the original matrix's determinant, this quotient is your *y* value.

Practice

Solve each of the following systems using Cramer's Rule, if possible.

1.
$$5x + 4y = 2$$
$$-x + y = -22$$

$$2x - 5y = 2$$
$$3x - 7y = 1$$

3.
$$\begin{aligned} -2x + 8y &= 1\\ x - 4y &= 5 \end{aligned}$$

More Practice

Solve each of the following systems using Cramer's Rule, if possible.

1. $3x - 10y = 15 5x + 4y = 22$	2. $2x + y = 0.3$ 3x - y = -1.3
x + y - z = 2 3. $2x - y + z = -5$	2x - 3y + 4z = 10 4. $6x - 9y + 12z = 24$

$$x-2y+3z = 4$$
 $x+2y-3z = 5$