Cramer's Rule for a 2 by 2 Matrix

Name _____

Date _____ Period _____

When given a system of equations,

$$ax + by = e$$
$$cx + dy = f$$

We can create a coefficient matrix from the coefficients of the variables.

$$\det\begin{bmatrix} a & b \\ c & d \end{bmatrix} = D$$

Then the system of equations,

$$ax + by = e$$
$$cx + dy = f$$

has solutions, $x = \dfrac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D}$ and $y = \dfrac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$

D = determinant of the coefficient matrix

This is knows as Cramer's Rule for Two Equations

Cramer's Rule

1. Put System of Equations in Form...

$$ax + by = e$$
$$cx + dy = f$$

2. Find Coefficient Matrix

3. Find Determinant of Coefficient Matrix

4. Calculate value of x.

$$x = \frac{\begin{vmatrix} & \\ & \end{vmatrix}}{D}$$

5. Calculate value of y.

$$y = \frac{\begin{vmatrix} & \\ & \end{vmatrix}}{D}$$

Use Cramer's Rule to solve the following system

$$3x - 6y = 24$$
$$5x + 4y = 12$$

Cramer's Rule

$$ax + by = e$$
$$cx + dy = f$$

$$x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D} \qquad y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$$

D = determinant of the coefficient matrix

Use Cramer's Rule to solve the following system

$$x + 2y = 8$$
$$3x - 5y = -9$$

Cramer's Rule

$$ax + by = e$$
$$cx + dy = f$$

$$x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D} \qquad y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$$

D = determinant of the coefficient matrix

Cramer's Rule

1. Put System of Equations in Form...

$$ax + by = e$$
$$cx + dy = f$$

2. Find Coefficient Matrix

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

3. Find Determinant of Coefficient Matrix
Set = D

4. Calculate value of x.

$$x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D}$$

5. Calculate value of y.

$$y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$$