Get a graphing calculator.

Bell Work

1. $X + Y =$
2. $XY =$
3. $YX =$

$$X = \begin{bmatrix} 2 & -5 \\ 3 & 0 \end{bmatrix} \qquad Y = \begin{bmatrix} -7 & 3 \\ 2 & -4 \end{bmatrix}$$

4. Solve the system of equations using inverse matrices.

$$4x - 9y = 42$$

$$11x + 5y = 56$$

Find the determinant of each matrix.

$$A = \begin{bmatrix} 4 & 8 \\ -7 & -6 \end{bmatrix}$$

$$4(-6) - -7(8) =$$

$$-24 + 56 =$$

$$32$$

1. Cross multiply.
2. Determinant = Down - Up

$$B = \begin{bmatrix} 3 & -9 \\ 5 & 4 \end{bmatrix}$$

$$3(4) - 5(-9) =$$

$$12 + 45 =$$

$$57$$

Find the determinant of each matrix.

$$C = \begin{bmatrix} 5 & 10 \\ 6 & -9 \end{bmatrix}$$

$$5(-9) - 6(10) =$$

$$-45 - 60 =$$

$$-105$$

There are many ways to write the determinant of C.

$$\text{determinant of } C = \det C = |C| = \begin{vmatrix} 5 & 10 \\ 6 & -9 \end{vmatrix}$$

Find the determinant of each matrix.

$$D = \begin{bmatrix} 4 & 6 & -3 \\ 0 & 11 & 2 \\ -9 & -5 & 8 \end{bmatrix}$$

The graphing calculator can do the determinant.

1. Type the matrix in.
2. 2^{nd} Matrix MATH det(
3. The matrix

$$\det D = -13$$

Find the solution to the system of equations using Cramer's Rule.

$$5x - 7y = 50$$
$$8x + 6y = -6$$

The top matrix is substituting the constants for the coefficients of the variables that you are looking for.

The bottom matrix is the matrix of the coefficients.

$$x = \frac{\begin{vmatrix} C_1 & B_1 \\ C_2 & B_2 \end{vmatrix}}{\begin{vmatrix} A_1 & B_1 \\ A_2 & B_2 \end{vmatrix}} = \frac{\begin{vmatrix} 50 & -7 \\ -6 & 6 \end{vmatrix}}{\begin{vmatrix} 5 & -7 \\ 8 & 6 \end{vmatrix}} = \frac{258}{86} = 3$$

$$y = \frac{\begin{vmatrix} A_1 & C_1 \\ A_2 & C_2 \end{vmatrix}}{\begin{vmatrix} A_1 & B_1 \\ A_2 & B_2 \end{vmatrix}} = \frac{\begin{vmatrix} 5 & 50 \\ 8 & -6 \end{vmatrix}}{\begin{vmatrix} 5 & -7 \\ 8 & 6 \end{vmatrix}} = \frac{-430}{86} = -5$$

$$(3, -5)$$

Find the solution to the system of equations using Cramer's Rule.

$$12x + 5y = -13$$
$$7x + 8y = 28$$

$$x = \frac{\begin{vmatrix} C_1 & B_1 \\ C_2 & B_2 \end{vmatrix}}{\begin{vmatrix} A_1 & B_1 \\ A_2 & B_2 \end{vmatrix}} = \frac{\begin{vmatrix} -13 & 5 \\ 28 & 8 \end{vmatrix}}{\begin{vmatrix} 12 & 5 \\ 7 & 8 \end{vmatrix}} = \frac{-244}{61} = -4$$

$$y = \frac{\begin{vmatrix} A_1 & C_1 \\ A_2 & C_2 \end{vmatrix}}{\begin{vmatrix} A_1 & B_1 \\ A_2 & B_2 \end{vmatrix}} = \frac{\begin{vmatrix} 12 & -13 \\ 7 & 28 \end{vmatrix}}{\begin{vmatrix} 12 & 5 \\ 7 & 8 \end{vmatrix}} = \frac{427}{61} = 7$$

$$(-4, 7)$$

Find the solution to the system of equations using Cramer's Rule.

$$5x - 9y + 6z = -64$$

$$8x - 4y + 11z = -65$$

$$9x + 7y + 4z = -2$$

$$A = \begin{bmatrix} -64 & -9 & 6 \\ -65 & -4 & 11 \\ -2 & 7 & 4 \end{bmatrix} \qquad C = \begin{bmatrix} 5 & -9 & -64 \\ 8 & -4 & -65 \\ 9 & 7 & -2 \end{bmatrix}$$

$$B = \begin{bmatrix} 5 & -64 & 6 \\ 8 & -65 & 11 \\ 9 & -2 & 4 \end{bmatrix} \qquad D = \begin{bmatrix} 5 & -9 & 6 \\ 8 & -4 & 11 \\ 9 & 7 & 4 \end{bmatrix}$$

$$x = \frac{\det(A)}{\det(D)} = -2$$

$$y = \frac{\det(B)}{\det(D)} = 4$$

$$z = \frac{\det(C)}{\det(D)} = -3$$

$$(-2, 4, -3)$$

Assignment:

Determinants and Cramer's Rule Worksheet