

**Solving Systems of Equations with Matrices** 11

1. Write the system of equations as a **matrix equation**.  
**[Coefficient Matrix] • [Variable Matrix] = [Constant Matrix]**  
Always a square matrix      Always a column matrix

2. Then solve the matrix equation.

Solve by hand.

1.  $-3x + 4y = 5$       2.  $x + y = 2$   
 $2x - y = -10$        $7x + 8y = 21$

$$\begin{bmatrix} 1 & 1 \\ 7 & 8 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 21 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 1 & 0 \\ 1 & -2 & 1 \\ -4 & 5 & -3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 5 \\ 6 \end{bmatrix}$$

Solve using a graphing calculator.  $A^{-1} \cdot B$

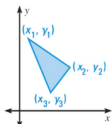
3.  $2x + y = 3$   
 $x - 2y + z = 5$   
 $-4x + 5y - 3z = 6$        $(24, -45, -109)$

Aug 3-9:01 AM

**Area of a Triangle with Matrices** 12

**Area of a Triangle**

The area of a triangle with vertices at  $(x_1, y_1)$ ,  $(x_2, y_2)$ , and  $(x_3, y_3)$  is given by:

$$\text{Area} = \pm \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$


\* Remember the bars mean determinant  
 \* Area is ALWAYS POSITIVE!

Find the area of the triangle.

1.  $(1, 7)$ ,  $(5, 8)$ ,  $(7, -4)$

$$\text{Area} = .5 \begin{vmatrix} 1 & 7 & 1 \\ 5 & 8 & 1 \\ 7 & -4 & 1 \end{vmatrix} = 25 \text{ u}^2$$

2. Vertices:  $(-2, 9)$ ;  $(10, -5)$ ;  $(3, 0)$        $\text{Area} = 19 \text{ u}^2$

Aug 3-10:42 AM