

# Precalculus

## 9-06 Applications of Matrices

### Cramer's Rule

- Used to solve \_\_\_\_\_
- $x_1 = \frac{|A_1|}{|A|}$                        $x_2 = \frac{|A_2|}{|A|}$
- $A =$  \_\_\_\_\_ matrix
- $A_n =$  \_\_\_\_\_ matrix with column  $n$  replaced with \_\_\_\_\_
- If  $|A| = 0$ , then \_\_\_\_\_ solution or \_\_\_\_\_ solutions

Use Cramer's Rule  $\begin{cases} 2x + y + z = 6 \\ -x - y + 3z = 1 \\ y - 2z = -3 \end{cases}$

### Area of triangle with vertices $(x_1, y_1)$ , $(x_2, y_2)$ , $(x_3, y_3)$

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

Find the area of triangle with vertices  $(-3, 1)$ ,  $(2, 4)$ ,  $(5, -3)$

**Lines in a Plane**

- If  $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0$ , then the points are collinear

**Find equation of line given 2 points  $(x_1, y_1)$  and  $(x_2, y_2)$** 

$$\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 0$$

Find the equation of the line passing through  $(-2, 9)$  and  $(3, -1)$

**Hill Cypher Encoding a Message**

1. Convert the message into \_\_\_\_\_
2. Choose a \_\_\_\_\_ encoding matrix.
3. \_\_\_\_\_ the message numbers into matrices of 1 row and the same number of \_\_\_\_\_ as the encoding matrix.
4. \_\_\_\_\_ the letter matrices with the encoding matrix.
5. The encoded message is the list of \_\_\_\_\_ produced.
6. Decode by using \_\_\_\_\_ of encoding matrix

_ = 0	I = 9	R = 18
A = 1	J = 10	S = 19
B = 2	K = 11	T = 20
C = 3	L = 12	U = 21
D = 4	M = 13	V = 22
E = 5	N = 14	W = 23
F = 6	O = 15	X = 24
G = 7	P = 16	Y = 25
H = 8	Q = 17	Z = 26

Encode LUNCH using  $\begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix}$