

Name: _____ Period: _____ Date: _____

10.5 Applications of Matrices and Determinants

Cramer's Rule

Let's solve the system with Cramer's rule.

$$\begin{cases} 3x + 5y = 7 \\ 4x + 9y = 11 \end{cases}$$

Step 1, find:

D- Determinant of the coefficients

$$D = \begin{vmatrix} 3 & 5 \\ 4 & 9 \end{vmatrix} =$$

D_x - Determinant of the coefficients when the coefficients of x are replaced with the constant terms

$$D_x = \begin{vmatrix} 7 & 5 \\ 11 & 9 \end{vmatrix} =$$

D_y - Determinant of the coefficients when the coefficients of y are replaced with the constant terms

$$D_y = \begin{vmatrix} 3 & 7 \\ 4 & 11 \end{vmatrix} =$$

Step 2: $x = \frac{D_x}{D}$ $y = \frac{D_y}{D}$

Solve each system using Cramer's rule by hand if it is a 2x2 and with a calculator if it is a 3x3.

1. $-6x - 5y = 106$ $-3x + 2y = 17$	2. $7x - 1y = 59$ $-2x + 8y = 68$
4. $-6x + 9y + 2z = -95$ $-5x + 7y - 1z = -58$ $8x - 3y - 4z = 91$	5. $8x - 4y - 9z = 131$ $3x - 6y + 5z = 4$ $-2x + 7y - 1z = -28$
7. $1x - 5y = 78$ $-6x + 3y = -90$	8. $-2x + 9y - 8z = -43$ $-5x - 7y + 4z = -8$ $-6x + 1y - 9z = -29$
10. $-5x - 4y - 9z = -40$ $7x - 3y + 1z = 78$ $-5x + 2y + 7z = 0$	11. $-6x - 9y = -3$ $-3x - 8y = -26$

Finding the Area of Triangles using matrices

Formula for the area of a triangle using determinants

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

Use determinants to calculate the area. Show your work.

1. Calculate the area of the triangle with the following points: (-4, 1), (-1, -4), (-1, 3)	2. Calculate the area of the triangle with the following points: (-3, -4), (-6, -7), (-1, -8)
4. Calculate the area of the triangle with the following points: (0, -1), (-3, 0), (-4, -2)	5. Calculate the area of the triangle with the following points: (-8, -10), (-3, -11), (-5, -5)
7. Calculate the area of the triangle with the following points: (0, -3), (6, 0), (1, 0)	8. Calculate the area of the triangle with the following points: (-4, 3), (-9, -2), (-6, 0)
10. Calculate the area of the triangle with the following points: (0, -2), (5, 8), (-3, 0)	11. Calculate the area of the triangle with the following points: (2, -5), (-1, -9), (2, -9)