Course Number

Instructor

Date

Section 8.5 Applications of Matrices and Determinants

Objective: In this lesson you learned how to use Cramer's Rule to solve systems of linear equations.

Important Vocabulary	Define each term or concept.
Uncoded row matrices	
Coded row matrices	

I. Area of a Triangle (Page 599)

What you should learn
How to use determinants to find areas of triangles

The area of a triangle with vertices (x_1, y_1), (x_2, y_2), and (x_3, y_3) is

$$\text{Area} = \pm\frac{1}{2}\begin{vmatrix} & & \\ & & \\ & & \end{vmatrix}$$

where the symbol ± indicates that the appropriate sign should be chosen to yield a positive area.

Example 1: Find the area of a triangle whose vertices are $(-3, 1)$, $(2, 4)$, and $(5, -3)$.

II. Collinear Points (Page 600)

What you should learn
How to use determinants to decide whether points are collinear

Collinear points are . . .

Three points (x_1, y_1), (x_2, y_2), and (x_3, y_3) are collinear if and only if

$$\begin{vmatrix} & & \\ & & \\ & & \end{vmatrix} = 0.$$

Example 2: Determine whether the points $(-2, 4)$, $(0, 3)$, and $(8, -1)$ are collinear.

III. Cramer's Rule (Pages 601–603)

What you should learn
How to use Cramer's Rule to solve systems of linear equations

Cramer's Rule states that if a system of n linear equations in n variables has a coefficient matrix A with a nonzero determinant $|A|$, the solution of the system is

$$x_1 = \frac{|A_1|}{|A|}, \quad x_2 = \frac{|A_2|}{|A|}, \ldots, x_n = \frac{|A_n|}{|A|}$$

where the ith column of A_i is _____

_____.

Cramer's Rule does not apply if the determinant of the coefficient matrix is _____, in which case the system has either no solution or _____.

Example 3: Use Cramer's Rule to solve the system of linear equations.

$$\begin{cases} 2x + y + z = 6 \\ -x - y + 3z = 1 \\ \quad y - 2z = -3 \end{cases}$$

IV. Cryptography (Pages 604–606)

What you should learn
How to use matrices to code and decode messages

A cryptogram is . . .

To use matrix multiplication to encode and decode messages, . . .

Homework Assignment

Page(s)

Exercises