Name: _____ 614 Applications of Determinants

1. Evaluate each determinant. Do NOT use a calculator. Show all work.

a.) $\begin{vmatrix} 3 & 7 \\ -1 & 4 \end{vmatrix}$

b.) $\begin{vmatrix} -7 & 1 & 3 \\ 2 & -1 & 5 \\ 3 & 0 & 2 \end{vmatrix}$

2. Solve using Cramer's Rule

a.) $5x+7y=8$
$-2x-9y=-2$

b.) $3x+2y-z=-6$
$x-3y+2z=2$
$5x \quad -6z=-7$

3. Find all the values of x for which

$$\begin{vmatrix} x-4 & 0 & 0 \\ 0 & x+4 & 0 \\ 0 & 0 & x+1 \end{vmatrix} = 0$$

4. Use the fact that the equation of a line passing through (x_1,y_1) and (x_2,y_2) can be written as

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

to find the equation of the line passing through (–3, –1) and (2, 9). Write your equation in slope intercept form.

5. Use determinants to find the area of the parallelogram whose corners are located at A (2,6), B(7,10) and C(9, –2).

6. Three vectors **x** = (4, 5, 2), **w** =(6, –1, 4) and **q** =(–3, 5, 2) determine a parallelpiped. Using determinants, find its volume.

$$\begin{vmatrix} 4 & 5 & 2 \\ 6 & -1 & 4 \\ -3 & 5 & 2 \end{vmatrix} = 154 u^3$$

7. Using determinants, find a vector together with **v** = (4, –8) that will determine a parallelogram with an area of 100 square units.

$$\begin{vmatrix} 4 & -8 \\ x & y \end{vmatrix} = 100$$

$4y + 8x = 100$

$4y + 64 = 100$

$4y = 36$

$x = 8$

one possible answer $\langle 8, 9 \rangle$

8. Find the equation of a plane containing the point (3, –5, 9) that is perpendicular to the vector **m** = (–2, 4, 7).

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

$-6 - 20 + 63 = d$

$37 = d$

$-2x + 4y + 7z = 37$

9. Find the area of a triangle formed by the points A (3, –5) B (2, 6) and C(–3,5)

$\overrightarrow{AB}$ $(-1, 11)$

$\overrightarrow{AC}$ $(-6, 10)$

$\frac{1}{2}\begin{vmatrix} -1 & 11 \\ -6 & 10 \end{vmatrix}$

$\frac{1}{2}\begin{vmatrix} 3 & -5 & 1 \\ 2 & 6 & 1 \\ -3 & 5 & 1 \end{vmatrix}$

$\frac{1}{2}(56) = 28$

10. Solve each system using Cramer's rule.

a.) $x + 2y = 3$
$5x + 10y = 6$

same line

infinite solutions

b.) $5x - y = -13$
$5x - y = -12$

$N_y \begin{vmatrix} 5 & -13 \\ 5 & -12 \end{vmatrix} = -60 + 65 = 5$

$D = 0$

c.) Explain how to interpret the results of the values of the determinants