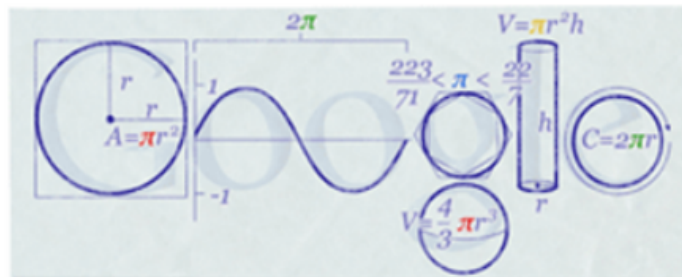




MATH MAJORS EXCHANGING HIGH π s



7-8 Applications of Determinants

Ex 1 Solve using Cramer's Rule

$$4x - 2y = 10$$

$$3x - 5y = 11$$

$$x = \frac{\begin{vmatrix} 10 & -2 \\ 11 & -5 \end{vmatrix}}{\begin{vmatrix} 4 & -2 \\ 3 & -5 \end{vmatrix}} = \frac{-50 - (-22)}{-20 - (-6)} = \frac{-28}{-14} = 2$$

$$y = \frac{\begin{vmatrix} 4 & 10 \\ 3 & 11 \end{vmatrix}}{-14} = \frac{44 - 30}{-14} = \frac{14}{-14} = -1$$

$(2, -1)$

Ex 2 Solve using Cramer's Rule

$$3x + y = 14$$

$$2x - 5y = 15$$

$$x = \frac{\begin{vmatrix} 14 & 1 \\ 15 & -5 \end{vmatrix}}{\begin{vmatrix} 3 & 1 \\ 2 & -5 \end{vmatrix}} = \frac{-85}{-17} = 5$$

$$y = \frac{\begin{vmatrix} 3 & 14 \\ 2 & 15 \end{vmatrix}}{\begin{vmatrix} 3 & 1 \\ 2 & -5 \end{vmatrix}} = \frac{17}{-17} = -1$$

$(5, -1)$

To find the area of a triangle, use the following formula:

$$A = \pm \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} \quad \text{(the answer will always be positive)}$$

If the points are collinear, the area = 0

Ex 3 Find the area of the triangle with vertices

(1, 0), (2, 2), (4, 3)

$$\frac{1}{2} \begin{vmatrix} 1 & 0 & 1 & 1 & 0 \\ 2 & 2 & 1 & 2 & 2 \\ 4 & 3 & 1 & 4 & 3 \end{vmatrix}$$

$$2 + 0 + 6 - 8 - 3 - 0$$
$$\frac{1}{2} (-3) = \boxed{+1.5}$$

Ex 4 Find the area of the triangle with vertices

$(-2, -3), (0, 4), (2, -3)$

$$\frac{1}{2} \begin{vmatrix} -2 & -3 & 1 \\ 0 & 4 & 1 \\ 2 & -3 & 1 \end{vmatrix}$$

14

$$-2 \begin{vmatrix} 4 & 1 \\ -3 & 1 \end{vmatrix} + 2 \begin{vmatrix} -3 & 1 \\ 4 & 1 \end{vmatrix}$$

$$-2(7) + 2(-7) \\ -28$$

Homework

worksheet
+
p.567 #1&2