

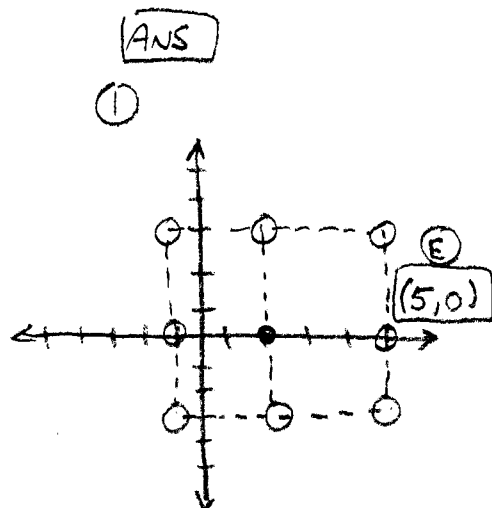
BE - Alg. 2/Precalc | Monday 9-28-09

ACT ① THE SIDES OF A SQUARE ARE 3 cm long. ONE VERTEX OF THE SQUARE IS AT $(2, 0)$ ON A SQUARE COORDINATE GRID MARKED IN CENTIMETER UNITS. WHICH OF THE FOLLOWING POINTS COULD ALSO BE A VERTEX OF THE SQUARE?

- Ⓐ $(-4, 0)$
- Ⓑ $(0, 1)$
- Ⓒ $(1, -1)$
- Ⓓ $(4, 1)$
- Ⓔ $(5, 0)$

② WHAT IS THE LEAST COMMON MULTIPLE OF 70, 60, AND 50?

- Ⓐ 60 Ⓑ 180 Ⓒ 210 Ⓓ 2100 Ⓔ 210,000



② USE PRIME FACTORIZATIONS

70	60	50
7 10	6 10	5 10
7 2 5	2 3 2 5	5 2 5
✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓

LCM $\Rightarrow 7 \cdot 2 \cdot 5 \cdot 3 \cdot 2 \cdot 5$

$7 \cdot 2 \cdot (10)(15) = 150$

$7 \cdot 300 = \boxed{2100}$

Ch. 4-6 Solving Systems of Linear Equations using Determinants

Pg 189 Given a system of linear equations where $a, b, c, d, e, f = \text{Any Real Number}$, solve by EBA:

$$ax + by = e \xrightarrow{(-d)} -adx - bdy = -de$$

$$cx + dy = f \xrightarrow{(b)} bcx + bdy = bf$$

Eliminate y

$$(bc - ad)x = bf - de$$

$$x = \frac{bf - de}{bc - ad} = \frac{de - bf}{ad - bc}$$

$$ax + by = e \xrightarrow{(-c)} -acx - bcy = -ce$$

$$cx + dy = f \xrightarrow{(a)} acx + ady = af$$

Eliminate x

$$(ad - bc)y = af - ce$$

*

$$\therefore (x, y) = \left(\frac{de - bf}{ad - bc}, \frac{af - ce}{ad - bc} \right)$$

$$y = \frac{af - ce}{ad - bc}$$

As determinants:

$$\begin{array}{ccc} (de - bf) & (af - ce) & \text{denominator} \\ \downarrow & \downarrow & \downarrow \\ \begin{vmatrix} e & b \\ f & d \end{vmatrix} & \begin{vmatrix} a & e \\ c & f \end{vmatrix} & \begin{vmatrix} a & b \\ c & d \end{vmatrix} \end{array}$$

Cramer's Rule: $\begin{cases} ax + by = e \\ cx + dy = f \end{cases}$ Solution (x, y) is:

$$x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}}, y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}}$$

where $\begin{vmatrix} a & b \\ c & d \end{vmatrix} \neq 0$

COEFFICIENTS

$\begin{pmatrix} e \\ f \end{pmatrix}$

CONSTANTS

Solve using CRAMER'S RULE:

$$\begin{cases} 5x + 4y = 28 \\ 3x - 2y = 8 \end{cases}$$

The determinant of the x & y coefficient matrix

is: $\begin{vmatrix} 5 & 4 \\ 3 & -2 \end{vmatrix} = (-10) - (12) = -22$

$$x = \frac{\begin{matrix} \text{CONSTANTS} \\ \begin{vmatrix} 28 & 4 \\ 8 & -2 \end{vmatrix} \end{matrix}}{-22} = \frac{-56 - (32)}{-22} = \frac{-88}{-22} = 4 = x$$

$$y = \frac{\begin{matrix} \text{CONSTANTS} \\ \begin{vmatrix} 5 & 28 \\ 3 & 8 \end{vmatrix} \end{matrix}}{-22} = \frac{40 - 84}{-22} = \frac{-44}{-22} = 2 = y$$

$$(x, y) = (4, 2)$$

ck. $\begin{cases} 5x + 4y \stackrel{?}{=} 28 \\ 3x - 2y \stackrel{?}{=} 8 \end{cases}$

$$\begin{cases} 5(4) + 4(2) \stackrel{?}{=} 28 \checkmark \\ 3(4) - 2(2) \stackrel{?}{=} 8 \checkmark \end{cases}$$

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Solve using Cramer's Rule:

$$\begin{cases} 5x + 7y = 13 \\ 2x - 5y = 13 \end{cases} \quad \begin{vmatrix} 5 & 7 \\ 2 & -5 \end{vmatrix} = -25 - 14 = \boxed{-39}$$

$$X = \frac{\begin{vmatrix} 13 & 7 \\ 13 & -5 \end{vmatrix}}{-39} = \frac{-65 - 91}{-39} = \frac{-156}{-39} = \boxed{4}$$

$$Y = \frac{\begin{vmatrix} 5 & 13 \\ 2 & 13 \end{vmatrix}}{-39} = \frac{65 - 26}{-39} = \frac{+39}{-39} = \boxed{-1}$$

$$\boxed{(4, -1)}$$



Summary: $5x + 7y = 13$

$2x - 5y = 13$

↑
COEFFICIENTS
OF X

↑
COEFFICIENTS
OF Y

↑
CONSTANTS

$$X = \frac{\begin{vmatrix} \text{CONSTANTS} & \text{COEFFICIENTS OF Y} \\ \text{COEFFICIENTS OF X} & \text{COEFFICIENTS OF Y} \end{vmatrix}}$$

$$Y = \frac{\begin{vmatrix} \text{COEFFICIENTS OF X} & \text{CONSTANTS} \\ \text{COEFFICIENTS OF X} & \text{COEFFICIENTS OF Y} \end{vmatrix}}$$

CAN you guess How TO SOLVE A SYSTEM OF 3 LIN. EQUATIONS?

CRAMERS RULE for a 3×3 :

EX 3
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$$\begin{aligned} 3x + y + z &= -1 \\ -6x + 5y + 3z &= -9 \\ 9x - 2y - z &= 5 \end{aligned}$$

CONSTANTS

$$x = \frac{\begin{array}{c} \text{CONSTANTS} \\ \downarrow \\ \begin{vmatrix} -1 & 1 & 1 \\ -9 & 5 & 3 \\ 5 & -2 & -1 \end{vmatrix} \end{array}}{\begin{vmatrix} 3 & 1 & 1 \\ -6 & 5 & 3 \\ 9 & -2 & -1 \end{vmatrix}} = -9$$

$$y = \frac{\begin{array}{c} \text{CONSTANTS} \\ \downarrow \\ \begin{vmatrix} 3 & -1 & 1 \\ -6 & -9 & 3 \\ 9 & 5 & -1 \end{vmatrix} \end{array}}{-9}$$

$$z = \frac{\begin{array}{c} \text{CONSTANTS} \\ \downarrow \\ \begin{vmatrix} 3 & 1 & -1 \\ -6 & 5 & -9 \\ 9 & -2 & 5 \end{vmatrix} \end{array}}{-9}$$

$$\left(\frac{2}{9}, -\frac{4}{3}, -\frac{1}{3} \right)$$

• Homeworks Pg. 192 #4, 6, 12, 13. Pg. 193 #26