

SYSTEMS OF EQUATIONS REVIEW

- 1) Graphing 2) Elim 3) Subst 4) Cramer's Rule
5) Matrix Eq.

1) Graphing - Menu - 3-3-1-3

2) 2-variable systems

$$f) \begin{cases} \frac{1}{3}x + \frac{1}{3}y = 5 \\ \frac{1}{6}x - \frac{1}{9}y = 0 \end{cases}$$

Substitution

- 1) Isolate a variable
2) Sub it into 2nd eq.

$$4x - 7y = -25$$

$$5x + 3y = 4$$

$$y = \frac{4 - 5x}{3}$$

$$y = \frac{4 - 5x}{3}$$

$$y = \frac{4 - 5(-1)}{3}$$

$$= \frac{4}{3} + \frac{5}{3}$$

$$= \frac{9}{3} = 3$$

$$(-1, 3)$$

$$4x - 7\left(\frac{4 - 5x}{3}\right) = -25$$

$$3\left[4x - \frac{28}{3} + \frac{35x}{3} = -25\right]$$

$$12x - 28 + 35x = -75$$

$$\frac{47x}{47} = \frac{-47}{47}$$

$$x = -1$$

No solution

$$\begin{array}{r} 4x + 3 = 4x - 7 \\ -4x \quad -4x \\ \hline 3 = -7 \end{array}$$

$$3 = -7$$

Infinitely Many

$$\begin{array}{r} 4x + 3 = 4x + 3 \\ -4x \quad -3 \quad -4x \quad -3 \\ \hline 0 = 0 \end{array}$$

$$0 = 0$$

Cramer's Rule

$$3x - 8y = -46$$

$$9x + 4y = 2$$

$$4x - 3y = -23$$

$$x = \frac{\begin{vmatrix} -46 & -8 \\ 2 & 4 \end{vmatrix}}{\begin{vmatrix} 3 & -8 \\ 9 & 4 \end{vmatrix}} = \frac{-184 + 16}{12 + 72} = \frac{-168}{84} = -2$$

$$y = \frac{\begin{vmatrix} 3 & -46 \\ 9 & 2 \end{vmatrix}}{\begin{vmatrix} 3 & -8 \\ 9 & 4 \end{vmatrix}} = \frac{6 + 414}{84} = \frac{420}{84} = 5$$

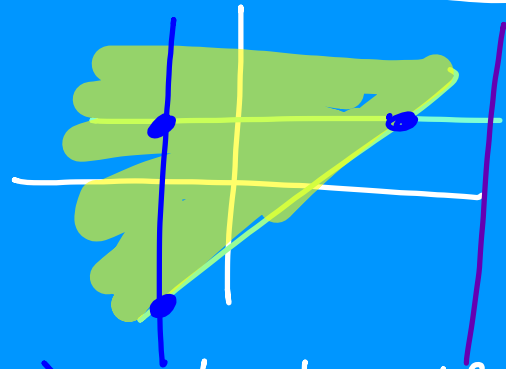
(-2, 5)

$$\begin{aligned} 7x - 4y &= 69 \\ 9x + 15y &= 129 \end{aligned} \quad [A]^{-1} \begin{bmatrix} 7 & -4 \\ 9 & 15 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = [A]^{-1} \begin{bmatrix} 69 \\ 129 \end{bmatrix}$$

$$\begin{aligned} \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{105 - 36} \begin{bmatrix} 15 & 4 \\ -9 & 7 \end{bmatrix} \cdot \begin{bmatrix} 69 \\ 129 \end{bmatrix} \\ &= \frac{1}{141} \begin{bmatrix} 1035 + 516 \\ -621 + 903 \end{bmatrix} \\ &= \frac{1}{141} \begin{bmatrix} 1551 \\ 282 \end{bmatrix} \\ &= \begin{bmatrix} 11 \\ 2 \end{bmatrix} \quad (11, 2) \end{aligned}$$



4/ Linear Programming



5) Must set up the box then write the func. & inequalities

$$x = \text{---} \quad y = \text{---}$$

6/ 3-Variable

Elimination

- 1) Group 2 + eliminate a variable
- 2) Group a different pair + eliminate the same variable
- 3) Group resulting eqs. + eliminate another variable.

Cramer's Rule
Solve for one variable.

$$x = \frac{\begin{vmatrix} - & - & - \\ - & - & - \\ - & - & - \end{vmatrix}}{\begin{vmatrix} - & - & - \\ - & - & - \\ - & - & - \end{vmatrix}}$$

a) Work bottom determ. by hand

b) Solve for x using calculator

Matrix Eq.

$$\begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}^{-1} \cdot \begin{bmatrix} \\ \\ \end{bmatrix}$$

$$\frac{\det(\begin{bmatrix} - & - & - \\ - & - & - \\ - & - & - \end{bmatrix})}{\det(\begin{bmatrix} - & - & - \\ - & - & - \\ - & - & - \end{bmatrix})}$$

$$\begin{vmatrix} 4 & -3 & 1 \\ 2 & 6 & 5 \\ -1 & 0 & -2 \end{vmatrix} = 4 \begin{vmatrix} 6 & 5 \\ 0 & -2 \end{vmatrix} - 3 \begin{vmatrix} 2 & 5 \\ -1 & -2 \end{vmatrix} + 1 \begin{vmatrix} 2 & 6 \\ -1 & 0 \end{vmatrix}$$