

$$31.) \quad 4x^2 - 56x + 9y^2 = -160$$

$$4x^2 + y^2 - 64 = 0; \quad y^2 = 64 - 4x^2$$

$$4x^2 - 56x + 9(64 - 4x^2) = -160$$

$$4x^2 - 56x + 576 - 36x^2 = -160$$

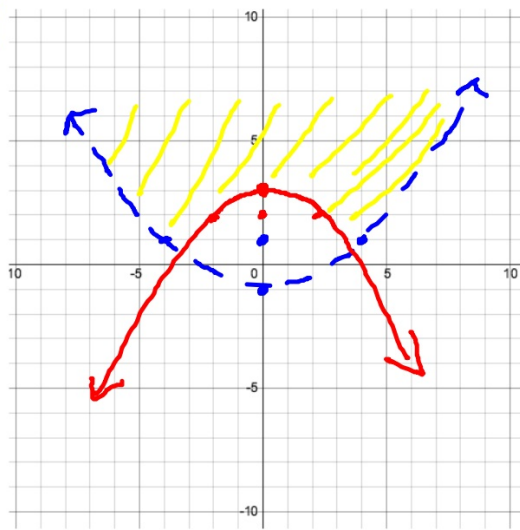
$$-32x^2 - 56x + 736 = 0$$

$$-8(4x^2 + 7x - 92) = 0$$

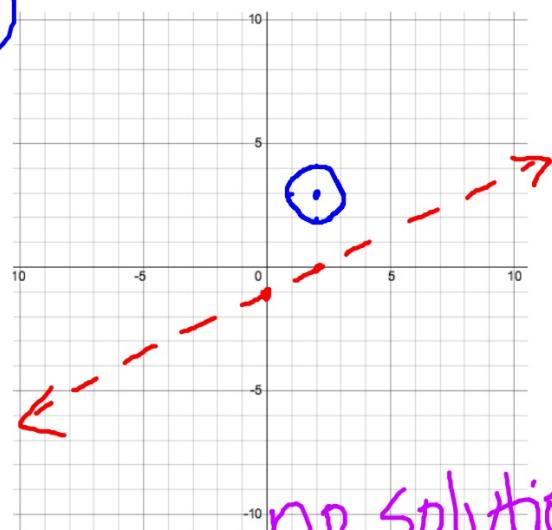
$$-8(x-4)(4x+23) = 0 \quad x = 4, \frac{-23}{4}$$

$$\begin{array}{l} y^2 = 64 - 64 \\ y = 0 \\ (4, 0) \end{array}$$

1



3



no solution

Quiz topics

Parabolas (sketching, focus, directrix, vertex, completing the square)

3x3 systems and word problems

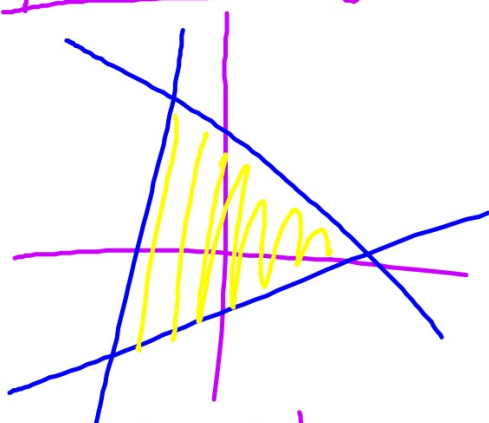
Random topics

non linear systems (equations and inequalities)

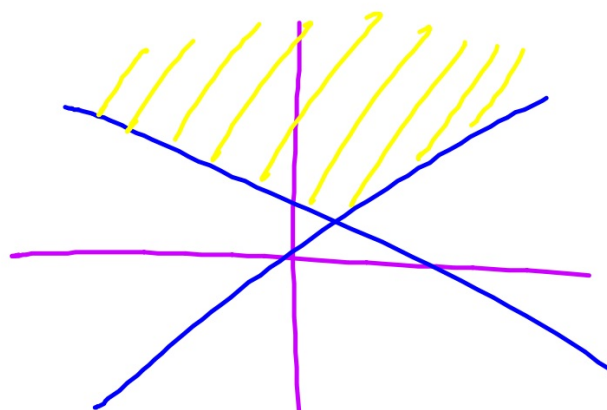
optimization

Optimization (also known as linear programming)

Feasible region



bounded



unbounded

Constraint(or objective function): a formula used to determine the maximum or minimum values
The maximums and minimums will occur at the vertices of the feasible region.

Examples of constraints (or objective functions)

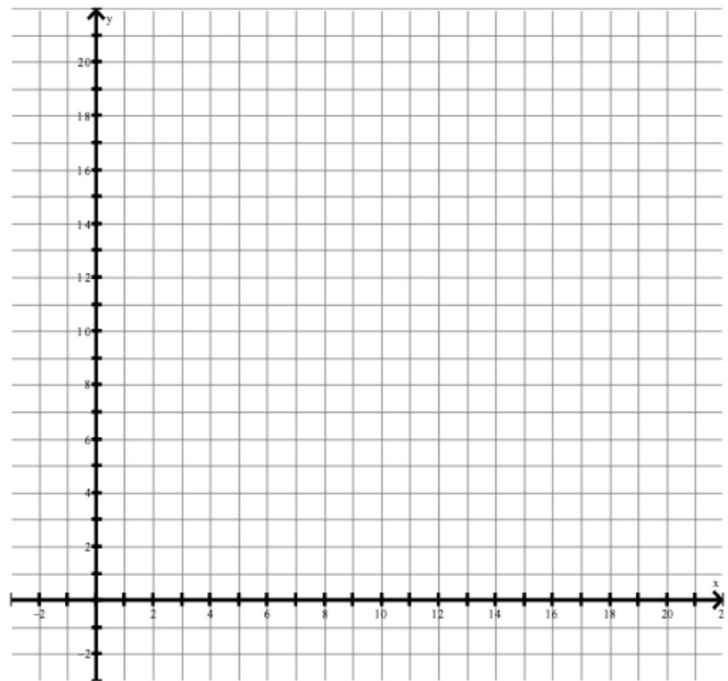
$$f(x, y) = 10x + 5y \quad \text{or} \quad z = 10x + 5y$$

Steps:

- 1) sketch the inequalities
- 2) determine the vertices of the enclosed (feasible) region
- 3) plug in the vertices to the constraint equation
- 4) find the maximum and/or minimum

Find the Maximum or Minimum Value for the Objective Function for each set of constraints.

5. Maximize:
 $z = 8x + 2y$
Subject to:
 $4x + 5y \leq 35$
 $x + 5y \leq 20$
 $y \geq 0$
 $x \geq 0$



6.

Minimize:

$$z = x - 2y$$

Subject to:

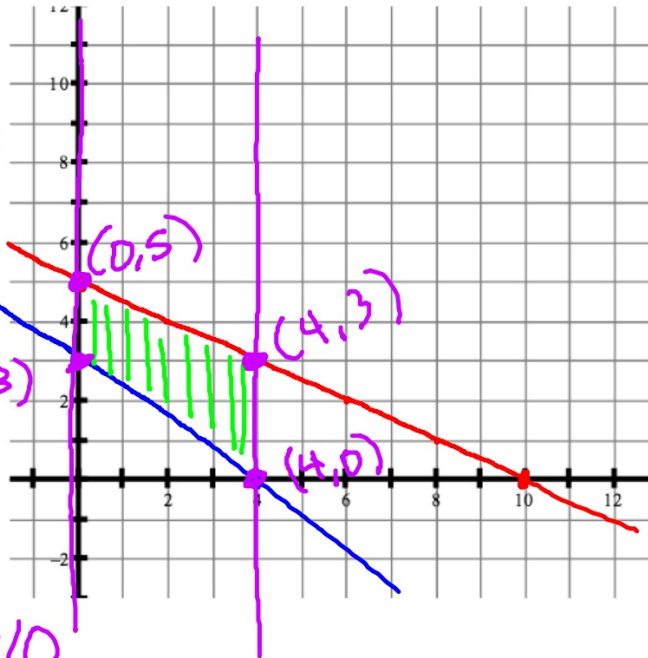
$$3x + 4y \geq 12 \quad (0, 3) \quad (4, 0)$$

$$x + 2y \leq 10 \quad (0, 5) \quad (10, 0)$$

$$0 \leq x \leq 4$$

(x, y)	$z = x - 2y$
$(0, 5)$	-10^*
$(0, 3)$	-6
$(4, 3)$	-2
$(4, 0)$	4

min is -10



7. Minimize:

$$z = 4x + 7y \quad \text{or } f(x,y) = 4x + 7y$$

Subject to:

$$x - y \geq 1$$

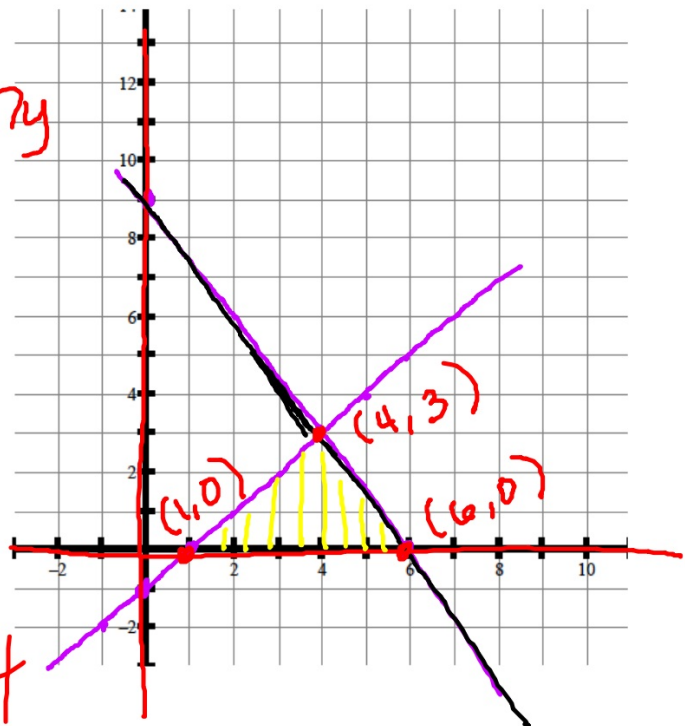
$$\cancel{3x + 2y \geq 18}$$

$$x \geq 0$$

$$y \geq 0$$

(x,y)	$f(x,y)$
$(1,0)$	4
$(4,3)$	37
$(6,0)$	24

min: 4



$$\begin{aligned} 2(x-y) &= 1 \\ 3x+2y &= 18 \\ 2x-2y &= 2 \end{aligned}$$

$$5x = 20$$

$$x = 4$$

$$(4, 3)$$

8. Maximize:
 $z = 5x + 2y$
Subject to:
 $4x - y \leq 16$
 $2x + y \geq 11$
 $x \geq 3$
 $y \leq 8$

