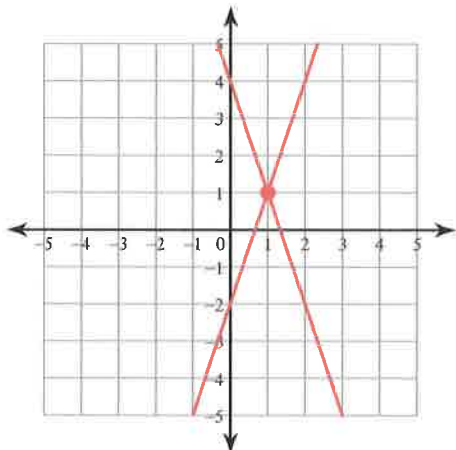


Systems of Two Equations

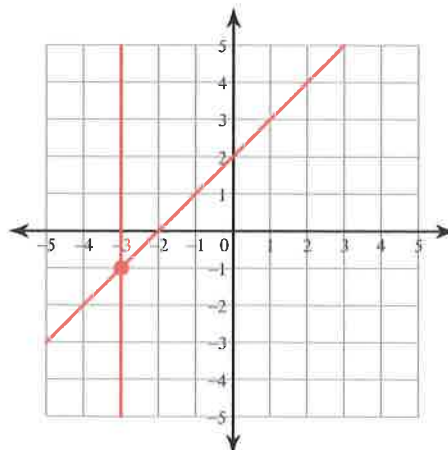
Solve each system by graphing.

$$\begin{aligned} 1) \quad & y = -3x + 4 \\ & y = 3x - 2 \end{aligned}$$



(1, 1)

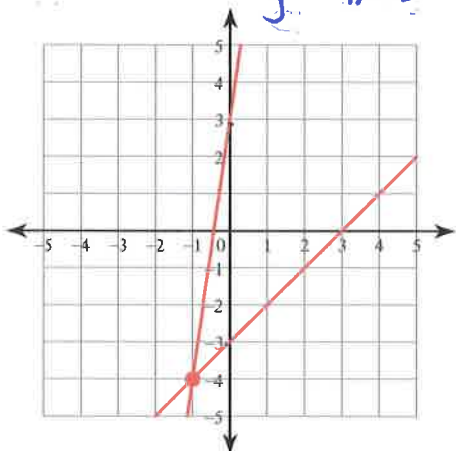
$$\begin{aligned} 2) \quad & y = x + 2 \\ & x = -3 \end{aligned}$$



(-3, -1)

$$\begin{aligned} 3) \quad & x - y = 3 \\ & 7x - y = -3 \end{aligned}$$

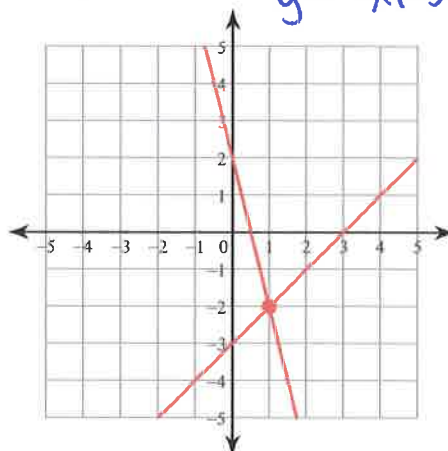
$$\begin{aligned} -y &= -x + 3 & y &= x - 3 \\ -y &= -7x - 3 & y &= 7x + 3 \end{aligned}$$



(-1, -4)

$$\begin{aligned} 4) \quad & 4x + y = 2 \\ & x - y = 3 \end{aligned}$$

$$\begin{aligned} y &= -4x + 2 \\ -y &= -x + 3 \rightarrow y = x - 3 \end{aligned}$$



(1, -2)

Solve each system by substitution.

$$\begin{aligned} 5) \quad & y = 4x - 9 \\ & y = x - 3 \end{aligned}$$

(2, -1)

$$\begin{aligned} 6) \quad & 4x + 2y = 10 \\ & x - y = 13 \end{aligned}$$

(6, -7)

$$\begin{aligned} 7) \quad & y = -5 \\ & 5x + 4y = -20 \end{aligned}$$

(0, -5)

$$\begin{aligned} 8) \quad & x + 7y = 0 \\ & 2x - 8y = 22 \end{aligned}$$

(7, -1)

9) $6x + 8y = -22$

$y = -5$

$(3, -5)$

11) $7x + 2y = -19$

$-x + 2y = 21$

$(-5, 8)$

13) $-7x + 4y = 24$

$4x - 4y = 0$

$(-8, -8)$

10) $-7x + 2y = 18$

$6x + 6y = 0$

$(-2, 2)$

12) $3x - 5y = 17$

$y = -7$

$(-6, -7)$

14) $4x - y = 20$

$-2x - 2y = 10$

$(3, -8)$

Solve each system by elimination.

15) $8x - 6y = -20$

$-16x + 7y = 30$

$(-1, 2)$

16) $6x - 12y = 24$

$-x - 6y = 4$

$(2, -1)$

17) $-8x - 10y = 24$

$6x + 5y = 2$

$(7, -8)$

18) $-24 - 8x = 12y$

$1 + \frac{5}{9}y = -\frac{7}{18}x$

$(6, -6)$

19) $-4y - 11x = 36$

$20 = -10x - 10y$

$(-4, 2)$

20) $-9 + 5y = -4x$

$-11x = -20 + 9y$

$(1, 1)$

21) $0 = -2y + 10 - 6x$

$14 - 22y = 18x$

$(2, -1)$

22) $-16y = 22 + 6x$

$-11y - 4x = 15$

$(-1, -1)$

23) $-16 + 20x - 8y = 0$

$36 = -18y - 22x$

$(0, -2)$

24) $-\frac{5}{7} - \frac{11}{7}x = -y$

$2y = 7 + 5x$

$(-3, -4)$

Critical thinking questions:

25) Write a system of equations with the solution $(4, -3)$.

Many answers. Ex: $x + y = 1$, $2x + y = 5$

$$-24 - 8x = 12y$$


$$-8x - 12y = 24$$

Systems Applications Solutions

1) Solve by any method mentioned.

If done algebraically:

$$2x + y = 8$$

$$\underline{-x + y = 2}$$

subtract:

$$3x = 6$$

$$x = 2$$

The small pitcher holds 2 cups of water.

$$2(2) + y = 8$$

$$4 + y = 8$$

$$y = 4$$

The large pitcher holds 4 cups of water.

4) Solve by any method mentioned.

If done algebraically:

$$3w + 3f = 17.70$$

$$\underline{2w + 3f = 15.55}$$

$$w = 2.15$$

The water slide costs \$2.15 per slide.

Substitute:

$$2(2.15) + 3f = 15.55$$

$$4.30 + 3f = 15.55$$

$$3f = 11.25$$

$$f = 3.75$$

The Ferris wheel costs \$3.75 per ride.

a) Solve by any method mentioned.

If done algebraically:

$$x + y = 20$$

$$\underline{3x + 11y = 100}$$

$$3(x + y = 20)$$

$$\underline{3x + 11y = 100}$$

$$3x + 3y = 60$$

$$\underline{3x + 11y = 100}$$

$$-8y = -40$$

$$8y = 40$$

$$y = 5$$

There are 5 multiple choice questions.

$$x + 5 = 20$$

$$x = 15$$

There are 15 T/F questions.

5) $5x + 2y = 48$

$$3x + 2y = 32$$

subtracting gives: $2x = 16$

and $x = 8$.

The cost of an adult ticket is \$8.

3) Solve by any method mentioned.

If done algebraically with substitution:

$$164c + 24d = 4240$$

$$d = 2c$$

$$164c + 24(2c) = 4240$$

$$164c + 48c = 4240$$

$$212c = 4240$$

$$c = 20$$

She can spend \$20 on each cat.

$$d = 2c$$

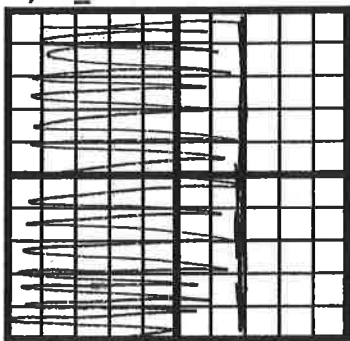
$$d = 2(20) = 40$$

She can spend \$40 on each dog.

Linear Inequalities and Programming Review

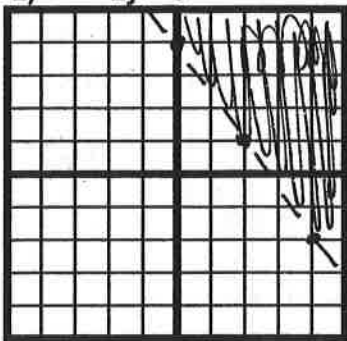
Graph each inequality.

1) $x \leq 2$



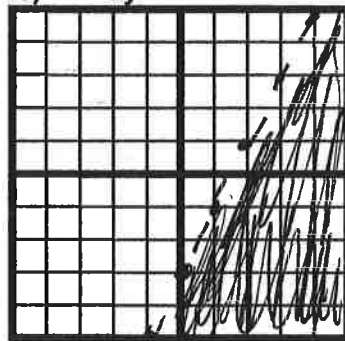
$y > -\frac{3}{2}x + 4$

2) $3x + 2y > 8$



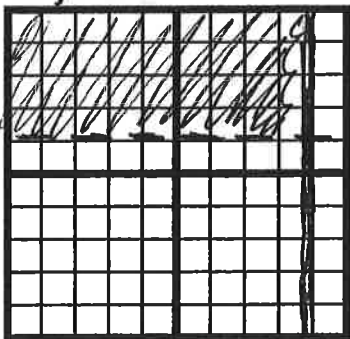
$-2y > -4x + 6$
 $y < 2x - 3$

3) $4x - 2y > 6$

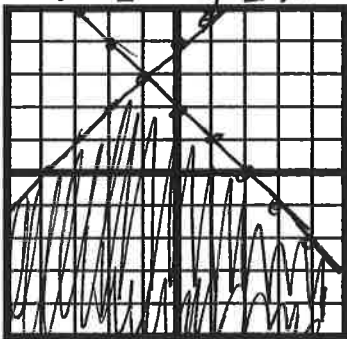


Solve each system of inequality by graphing.

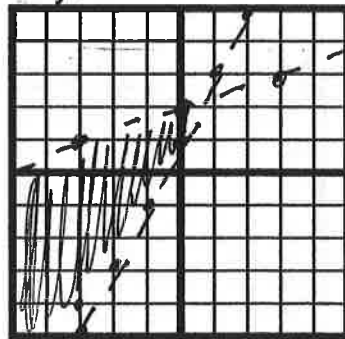
4) $x \leq 4$
 $y > 1$



5) $x + y \leq 2$ $y \leq -x + 2$
 $y - x \leq 4$ $y \leq x + 4$

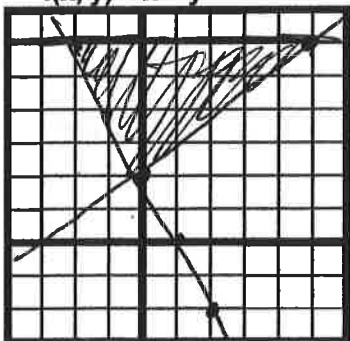


6) $y < \frac{1}{3}x + 2$
 $y > 2x + 1$



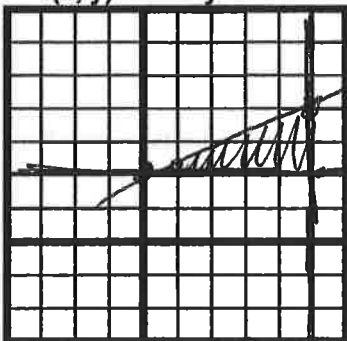
Graph each system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the given function for this region.

7) $4x - 5y \leq -10$ $y \geq \frac{4}{5}x + 2$
 $y \leq 6$
 $2x + y \geq 2$ $y \geq -2x + 2$
 $f(x, y) = x + y$



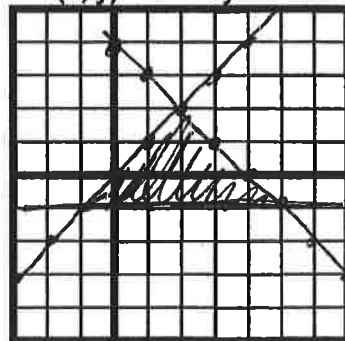
$(-2, 6) = 4$
 $(0, 2) = 2$ Min
 $(5, 6) = 11$ Max

8) $x \leq 5$
 $y \geq 2$
 $2x - 5y \geq -10$ $y \leq \frac{2}{5}x + 2$
 $f(x, y) = 3x + y$



$(0, 2) = 2$ Min
 $(5, 2) = 17$
 $(5, 4) = 19$ Max

9) $y \geq -1$
 $y \leq x + 4$
 $y \leq -x + 4$
 $f(x, y) = 4x + 3y$



$(-1, -1) = -7$ Min
 $(2, 2) = 14$
 $(5, -1) = 17$ Max

The Bakery is selling new types of bread. A loaf of Irish soda bread requires 4 cups of flour and 1 cup of sugar. A loaf of zucchini bread uses 2 cups of flour and 1 cup of sugar. There is 16 cups of flour and 7 cups of sugar available. The bakery makes \$2 profit for each loaf of Irish soda bread and \$3 per loaf of zucchini bread. To maximize profits, how many loaves of each type should be made?

A) Make a table to represent the information above.

Irish Soda	x	Flour $4x$	Sugar $1x$	Profit $2x$
Zucchini	y	$2y$	$1y$	$3y$
		≤ 16	≤ 7	

B) Write the restriction equations from the table above.

$$x \geq 0$$

$$y \geq 0$$

$$4x + 2y \leq 16$$

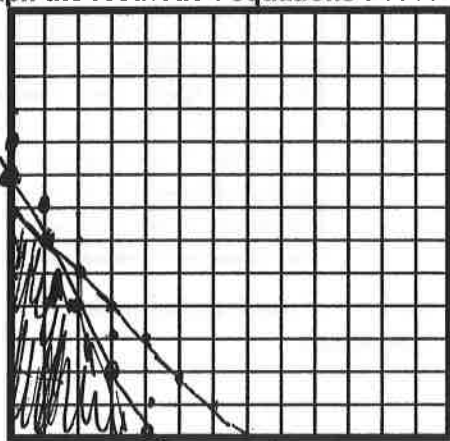
$$x + y \leq 7$$

$$P(x, y) = 2x + 3y$$

$$y \leq -2x + 8$$

$$y \leq -x + 7$$

C) Graph the restriction equations above.



D) Name the coordinates of the vertices above.

$$(0, 0) \quad (0, 7) \quad (1, 6) \quad (4, 0)$$

E) Find the maximum and minimum values of the given function for this region.

$$P(x, y) = 2x + 3y$$

$$(0, 0) = 0 \quad \text{Min}$$

$$(0, 7) = 21 \quad \text{Max}$$

$$(1, 6) = 20$$

$$(4, 0) = 8$$

F) Explain what The Bakery needs to do in order to maximize their profits.

The Bakery should not make any Irish Soda bread and 7 loaves of Zucchini bread.