Systems Test Review

Name: Answer Key

1. The graph of which equation does not intersect the graph of $y = x^2 - 2x - 1$?

a. $y = 2$ (c.) $y = -4x - 3$ on the calculator

b. $y = -2$ d. $y = 4x - 10$

2. Which of the following is the solution to the system $\begin{cases} 2a - b + c = -5 \\ a - b = -2 \\ 2a + b = 5 \end{cases}$.

$2(1) - 3 + (-4) = -5$ ✓

$1 - 3 = -2$ ✓

$2(1) + (3) = 5$ ✓

~~a.~~ $a = -2, b = 0, c = -2$ (c.) $a = 1, b = 3, c = -4$

~~b.~~ $a = 1, b = 3, c = -6$ ~~d.~~ $a = -2, b = 0, c = -1$

3. Joe makes a gumbo that uses sausage, rice, and vegetables. The sausage costs \$3 a pound, the rice costs \$1.50 a pound, and the vegetables cost \$0.75 a pound. Joe makes a batch of gumbo that uses a total of 20 pounds of ingredients and costs \$1.50 per pound. Joe uses the same weight of rice as he does vegetables. Write a system of equations for this situation where x represents the number of pounds of sausage used, y represents the number of pounds of rice used, and z represents the number of pounds of vegetables used.

x y z

$3x + 1.5y + .75z = 1.50$ | $x + y + z = 20$ | $y = z$

4. Solve by Substitution. Does the system of equations below have one solution, infinitely many solutions, or no solution? Explain.

$\begin{cases} -3x + 24y + 9z = -111 \\ x - 8y - 3z = 37 \\ 2x - 16y - 6z = 75 \end{cases}$ $\rightarrow$ $x = 8y + 3z + 37$

$-3(8y + 3z + 37) + 24y + 9z = -111$

$-24y - 9z - 111 + 24y + 9z = -111$

$-111 = -111$

Infinitely many solutions

$2(8y + 3z + 37) - 16y - 6z = 75$

$16y + 6z + 74 - 16y - 6z = 75$

$74 = 75$

No solution

Lines 1 and 2 coincide and are parallel to line 3. No solution because all three lines never intersect.

5. Solve by Substitution. Does the system of equations below have one solution, infinitely many solutions, or no solution? Explain.

$\begin{cases} -2x + y + 3z = 20 \\ -3x + 2y + z = 21 \\ 3x - 2y + 3z = -9 \end{cases}$ $\rightarrow y = 2x - 3z + 20$

$(-4, 3, 3)$

$-3x + 2(2x - 3z + 20) + z = 21$

$-3x + 4x - 6z + 40 + z = 21$

$x - 5z = -19$

$x = 5z - 19$

$3x - 2(2x - 3z + 20) + 3z = -9$

$3x - 4x + 6z - 40 + 3z = -9$

$-x + 9z = 31$

$-(5z - 19) + 9z = 31$

$-5z + 19 + 9z = 31$

$4z = 12$

$z = 3$

$x = 5(3) - 19$

$x = 15 - 19$

$x = -4$

$y = 2(-4) - 3(3) + 20$

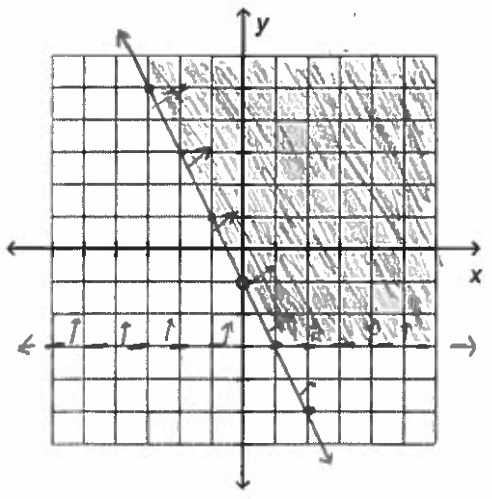
$y = -8 - 9 + 20$

$y = 3$

6. Solve the system of inequalities graphically.

$y \geq -2x - 1$

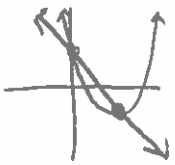
$y > -2$



7. Solve the system formed by the equations y= -3x+5 and y= x^2-6x+5 . If necessary, round answers to the nearest hundredth.

(0,5) and (3,-4)

on calculator



8. A glass-enclosed elevator at a sports arena moves upward from the ground floor at a constant speed of $h = 9t$. At the same time the elevator starts to rise, a cannon on the arena floor shoots a souvenir mini-basketball into the air at an initial velocity of 60 feet per second. The height of the mini-basketball (neglecting air resistance) can be modeled by the equation $h = -16t^2 + 60t$. In both equations, h is height in feet and t is time in seconds.

Find the time for the ball and the elevator to be at the same height again. If necessary, round your answer to the nearest tenth of a second.

$\begin{cases} h = 9t \\ h = -16t^2 + 60t \end{cases}$

t = 3.1875 seconds

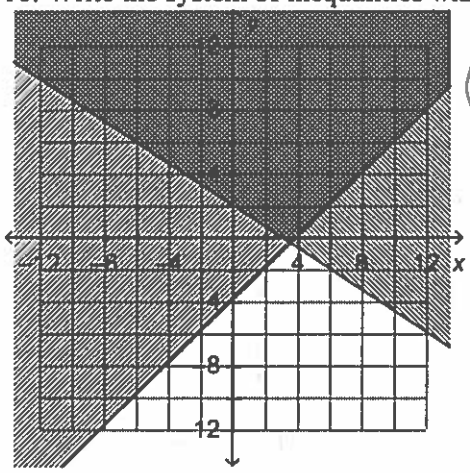
on calculator

9. How many times do the graphs of $y = -x^2 + 5x + 6$ and $2x + y = 16$ intersect?

y = -2x+16

Twice

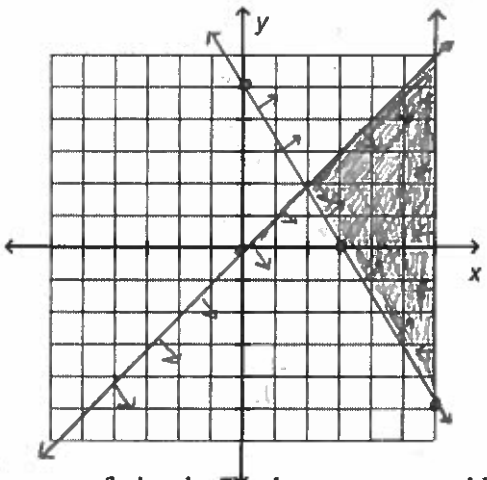
10. Write the system of inequalities which represents the solution region shown?



$\begin{cases} y \geq x - 4 \\ y \geq -\frac{2}{3}x + 2 \end{cases}$

11. Graph the solution set of the system of inequalities:

$\begin{cases} 5x + 3y \geq 15 \rightarrow y \geq -\frac{5}{3}x + 5 \\ x \geq y \rightarrow y \leq x \\ x \leq 6 \end{cases}$



x y z

12. Danielle and Inder brought apples, bananas, and oranges to a fruit sale. The bananas were sold for $0.50 each, while the apples and oranges were sold for $0.75 each. They sold 50 pieces of fruit and earned $33.50 total. If Danielle and Inder sold twice as many bananas as oranges, how many apples did they sell? Show your work.

$\begin{cases} x + y + z = 50 \\ .75x + .50y + .75z = 33.50 \\ y = 2z \end{cases}$

$x + 2z + z = 50$

$x + 3z = 50$

$x = -3z + 50$

$.75x + .5(2z) + .75z = 33.50$

$.75x + 1.75z = 33.50$

$.75(-3z + 50) + 1.75z = 33.50$

$-2.25z + 37.5 + 1.75z = 33.50$

$-.5z = -4$

$z = 8$

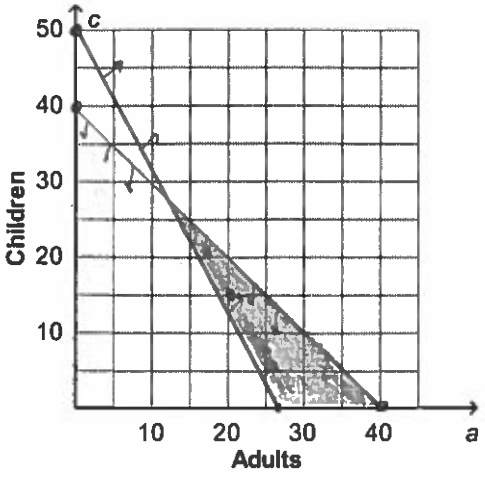
$y = 2(8) = 16$

$x = 50 - 16 - 8$

x = 26

13. A company provides bus trips to various events for a adults and c children. The company charges \$15 for each adult and \$8 for each child for a trip to an upcoming play. The bus has a maximum capacity of 40 people, and the company needs to earn a minimum of \$400 from this event to make a profit.

a. Write a system of inequalities that represents this situation.
b. Graph the system of inequalities from part a.
c. 20 adults and 15 children are going to the play. Can the bus hold that many people and does the company make a profit? Explain by using the graph from part b.

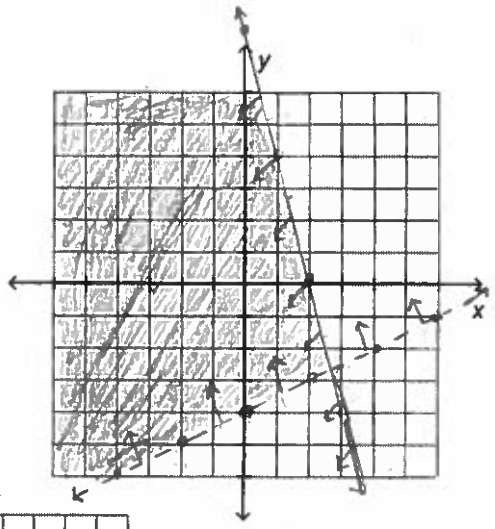


$$\begin{cases} 15a + 8c \geq 400 \\ a + c \leq 40 \\ a \geq 0 \\ c \geq 0 \end{cases} \rightarrow \begin{cases} c \geq -\frac{15}{8}a + 50 \\ c \leq -a + 40 \\ a \geq 0 \\ c \geq 0 \end{cases}$$

$15(20) + 8(15) = \$420$

The company will make a profit on the event.

14. a. Graph the system of inequalities $\begin{cases} y > \frac{1}{2}x - 4 \\ 4x + y \leq 8 \rightarrow y \leq -4x + 8 \end{cases}$ on the coordinate plane.



The solution set is in the upper left part of the graph.

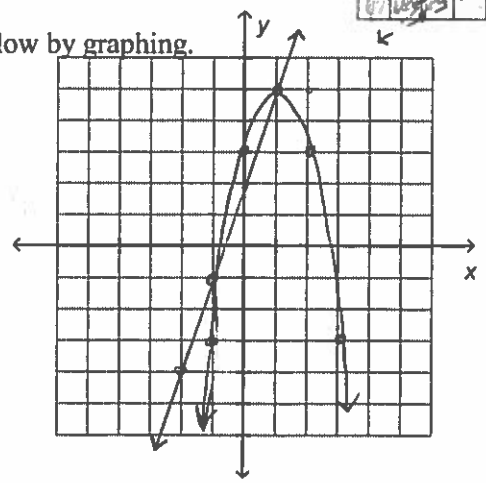
b. Describe the solution set of the system of inequalities from part a.
c. Is $(-2, -5)$ a solution of the system of inequalities? Explain your reasoning.

$(-2, -5)$ is not a solution because it falls on a dotted line.

15. Part A: Solve the system formed by the equations below by graphing.

$y = 3x + 2$

$y = -2x^2 + 4x + 3$



$(1, 5)$ and $(-.5, -.5)$

Part B: Is it possible for a system of one linear equation and one quadratic equation to have no solutions? Explain why or why not. It is possible if the two graphs never intersect.

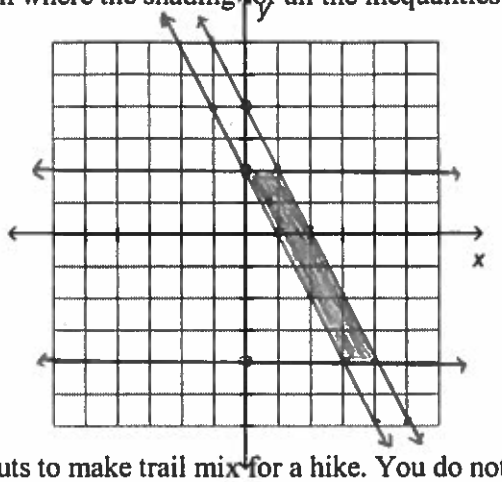
16. Describe the shape of the region where the shading for all the inequalities below overlaps.

$y \geq -4$

$y \leq 2$

$y \geq -2x + 2$

$y \leq -2x + 4$



The shaded region is a parallelogram.

17. You are using raisins and peanuts to make trail mix for a hike. You do not want to carry more than 3 pounds of trail mix. Let x be the weight of the raisins and y be the weight of the peanuts. Explain how to use a graph to show the possible weights of raisins and peanuts you can use.

$\begin{cases} x+y \leq 3 \\ x \geq 0 \\ y \geq 0 \end{cases}$

Graph this system and shade the inequalities. All points within the shaded region are possible combinations for raisins and peanuts.

18. Members of a school boosters club want to sell at least 10 school jackets and at least 18 caps during a fundraiser to cover their regular club expenses. The club will make \$16 for every jacket sold and \$2 for every cap sold. The club also wants the total amount of money earned to be at least \$300.

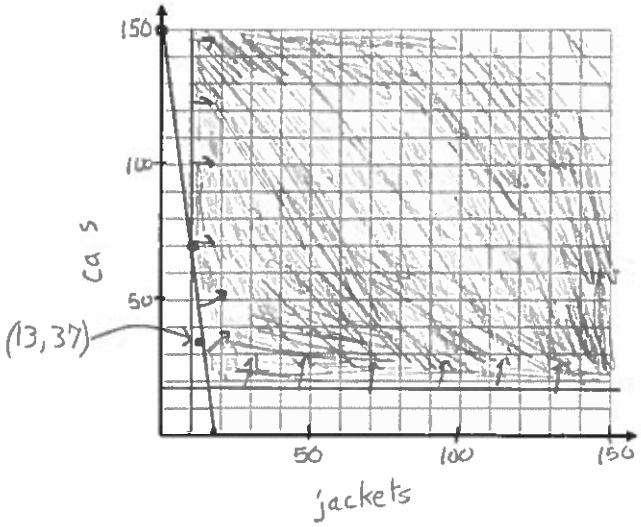
Part A: Write a system of inequalities that shows how many jackets and caps the club members need to sell to meet the conditions described above. Let x represent the number of school jackets sold and let y represent the number of caps sold.

Part B: Graph the system of inequalities from ***Part A***, shading in the region that represents the possible solutions to the system of equations. Locate and label the point (13,37) on the graph.

Part C: Will the club meet its goal of earning \$300 if it sells 13 jackets and 37 caps? Explain how you know. How much above or below its goal will the club be?

X = jacket y = cap

$\begin{cases} 16x + 2y \geq 300 \\ x \geq 10 \\ y \geq 18 \end{cases} \rightarrow \begin{cases} y \geq -8x + 150 \\ x \geq 10 \\ y \geq 18 \end{cases}$



$16(13) + 2(37) = \$282$

The club does not meet their goal because the point does not fall within the shaded regi.