

The semester A examination for Bridge to Algebra 2 consists of two parts. Part 1 is selected response; Part 2 is short answer.

- Students may use a calculator.
- If a calculator is used to find points on a graph, the appropriate calculator function (i.e. zero, intersect, minimum or maximum) should be used. The trace function should not be used.
- Decimal approximations must be accurate to three places after the decimal point.

The formulas below are provided in the examination booklet.

Equations of a Line
Standard Form: $Ax + By = C$
Slope-Intercept Form: $y = mx + b$ or $y = b + mx$
Slope: $\frac{y_2 - y_1}{x_2 - x_1}$

1. A recipe serving 8 people calls for 5 pounds of apples and 2 cups of flour. You want to prepare the recipe for 24 people.
 - a. How many pounds of apples will you need?

 - b. How many cups of flour will you need?

 - c. If a 5 pound bag of apples costs \$6.49, how much money will it cost to buy apples for the recipe for 24 people?

2. About $\frac{1}{90}$ of all human births are twins. If a nurse has attended 6,000 births, about how many of them resulted in twins?

3. A ship has a leak and takes on water at a rate of 5 gallons every 6 hours.
 - a. How many gallons of water would the ship take on in 24 hours?

 - b. How many gallons of water would the ship take on each hour (this is the hourly rate of change in gallons per hour)?

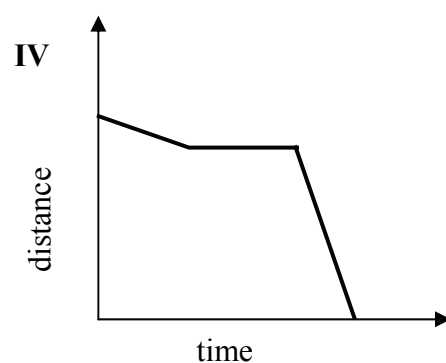
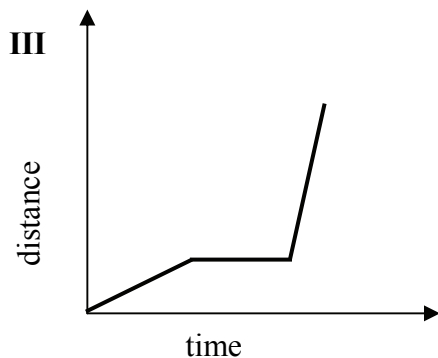
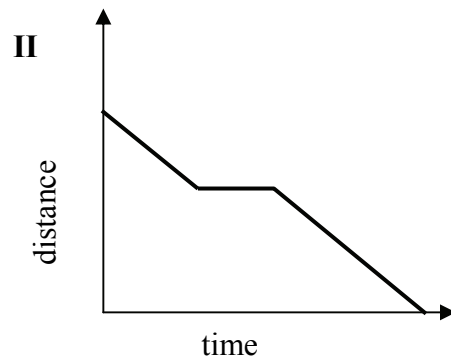
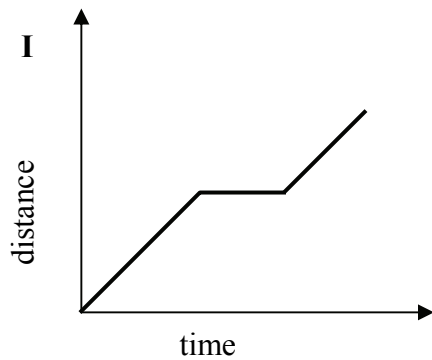
4. Stewart's puppy gained 8 pounds in 3 months. Crystal's puppy gained 14 pounds in 5 months. Whose puppy gained weight at a faster rate?

5. The following table shows the number of hits four different baseball players had last season, along with the number of times each player batted. Which player is the best hitter and why?

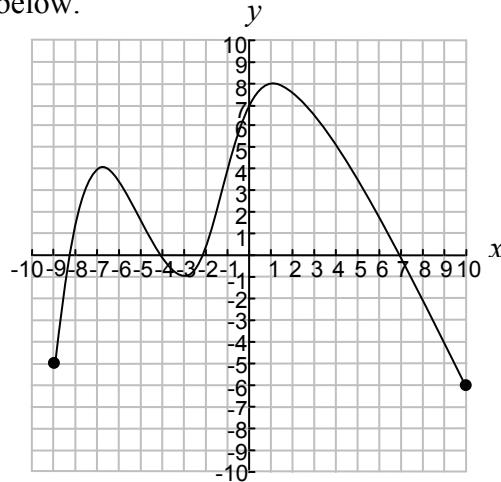
Player 1	Player 2	Player 3	Player 4
198 hits out of 611 times at bat	174 hits out of 541 times at bat	160 hits out of 500 times at bat	212 hits out of 634 times at bat

Match each question to the appropriate graph below.

6. Daniel gets up from his beach chair and begins to walk at a steady pace to the ice cream stand. After a while, he stops and talks to some friends. Then he continues to walk to the ice cream stand at his original steady pace.
- a. Which graph below could represent Daniel’s distance from his beach chair as a function of time?
- b. Which graph below could represent Daniel’s distance from the ice cream stand as a function of time?



7. Look at the graph below.



- a. What is the maximum value of the function?
- b. What is the minimum value of the function?
- c. What is the domain of the function?
- d. What is the range of the function?
- e. Over what interval(s) is the function increasing?
- f. Over what interval(s) is the function decreasing?

For items 8 through 10, solve each equation for the specified variable.

8. Solve for w . $P = 2l + 2w$

9. Solve for x . $y = \frac{1}{2}x + r$

10. Solve for t . $v = \frac{2}{3}t + m$

For items 11 through 14, solve for x .

11. $-3x = x + 12$

12. $2 - 4(x - 3) = -9(10 - x)$

13. $11 - 8x = 3\left(x + \frac{11}{8}\right)$

14. $5x + 10 = -3x - 14$

For items 15 through 18, solve and graph the solutions to the following inequalities.

15. $-3x \geq x + 12$

16. $3x \geq -x + 12$

17. $2 - 4(x - 3) < -9(10 - x)$

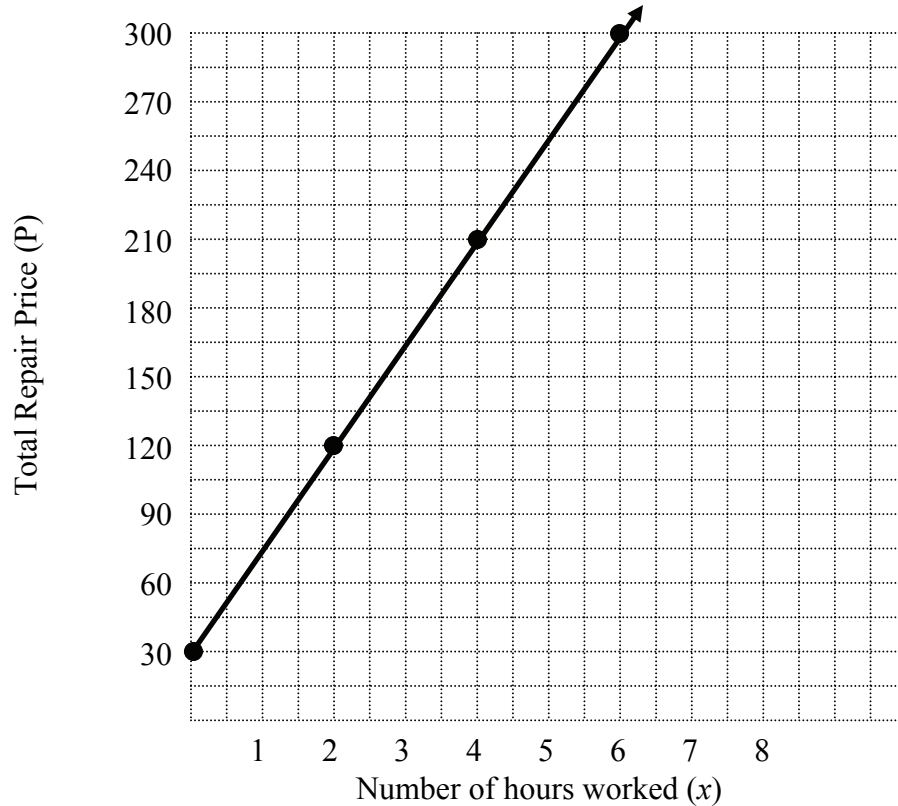
18. $5x + 10 > -3x - 14$

19. The following table shows the 2008 New Jersey taxes for the given income. Which of the following statements represents the rate of change?

Income (\$)	20500	21000	21500	22000
New Jersey tax 2008 (\$)	358.75	367.50	376.25	385.00

- A** The tax goes up \$500 for every \$8.75 increase in income.
- B** The tax goes up \$8.75 for every \$500 increase in income.
- C** The tax goes down \$500 for every \$8.75 increase in income.
- D** The tax goes down \$8.75 for every \$500 increase in income.
20. Jose wants to order a pizza. Pete's Pizza charges \$18 for a large pizza including any toppings. Paolo's Pizza charges \$15 for a large pizza plus \$0.75 per topping. For what number of toppings is Paolo's large pizza less expensive than Pete's large pizza?
- a. Write a linear inequality that can be solved to answer this question.
- b. Solve the linear inequality.
- c. What is the practical meaning of your solution?

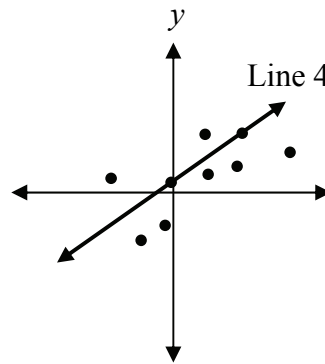
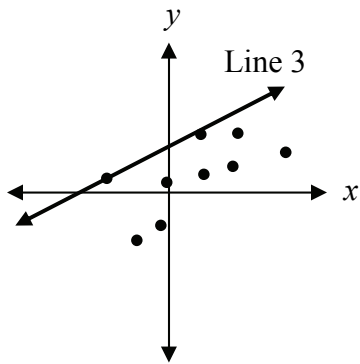
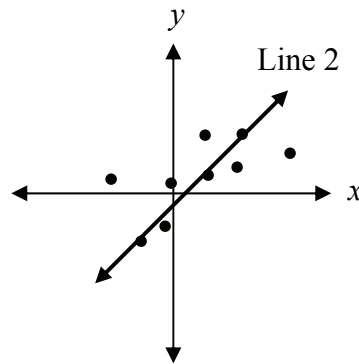
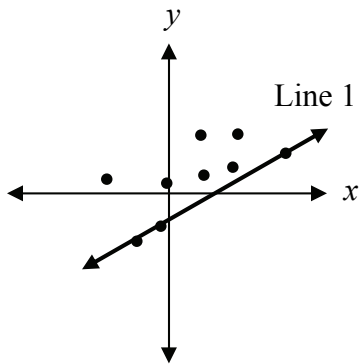
21. A water leak in your kitchen at home requires the immediate attention of a plumber. You call Paul the Plumber who charges \$30.00 just to come to your house plus \$45.00 an hour for the repair. The graph below represents Paul’s prices for repairs.



Based on the graph and the information given, write an equation that best represents how much you will pay if Paul does the repair.

22. You and two friends missed the school bus this morning so you decide to take a taxi to school. Altogether the three of you have a total of \$20.00 to pay for the taxi. The taxi’s initial charge is \$4.00 plus \$4.00 per mile driven for one person. Additional people each cost \$1.00 to ride.
- Write an inequality that can be used to determine how many miles, x , you and your two friends can ride in the taxi before running out of money.
 - Solve the inequality.
 - If school is 5 miles away, what is the practical meaning of your solution?

23. Sophi graphed some data and drew some lines through it. Which line (1, 2, 3, or 4) is the most reasonable estimate for a line of best fit?



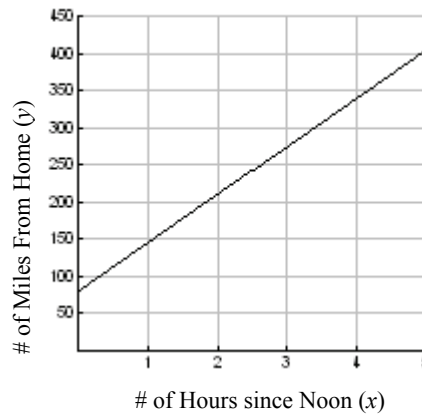
24. Marina is driving on a highway. At noon, she is already 80 miles from home. Between noon and 5 P.M., she travels at a constant rate of 65 miles per hour. The equation, table, and graph below represent Marina’s distance from home since noon as a function of time.

Equation: $y = 80 + 65x$

Table:

Hours Since Noon	Miles from Home
0	80
1	145
2	210
3	275
4	340
5	405

Graph:



- Show how to determine the y -intercept in each of these representations by circling it in the equation, in the table, and on the graph. What is the y -intercept?
- What does the y -intercept mean in the context of this situation?
- How is the slope (rate of change) determined in each of these representations? Put a box around the slope in the equation. Show how to get the slope using the table and the graph. What is the slope?
- What does the slope mean in the context of this situation?

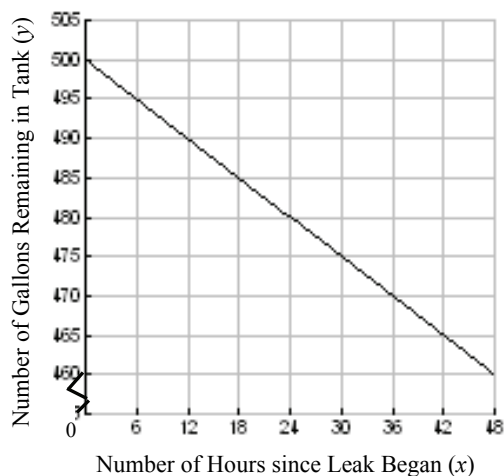
25. A 500 gallon underground water storage tank has a leak. The tank was full, then water leaves the tank at a constant rate of 5 gallons every 6 hours. The equation, table, and graph below represent the amount of water left in the tank as a function of time since the leak began.

Equation: $y = 500 - \frac{5}{6}x$

Table:

Number of Hours since Leak Began	Number of Gallons Remaining in Tank
0	500
1	$499\frac{1}{6}$
6	495
12	490
18	485
24	480

Graph:



- Show how to determine the y -intercept in each of these representations by circling it in the equation, in the table, and on the graph. What is the y -intercept?
- What does the y -intercept mean in the context of this situation?
- How is the slope (rate of change) determined in each of these representations? Put a box around the slope in the equation. Show how to get the slope using the table and the graph. What is the slope?
- What does the slope mean in the context of this situation?

For items 26 through 29 determine if each is a function. Indicate how you know your answer is correct.

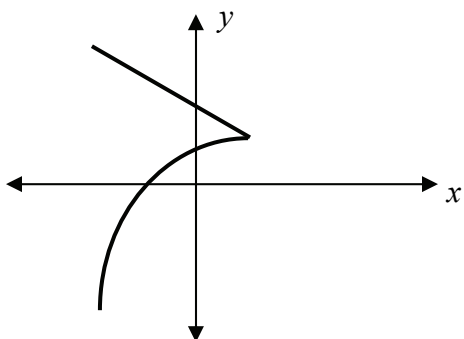
26.

x	y
-2	-1
-1	0
-1	3
0	7
3	2
5	6
5	4

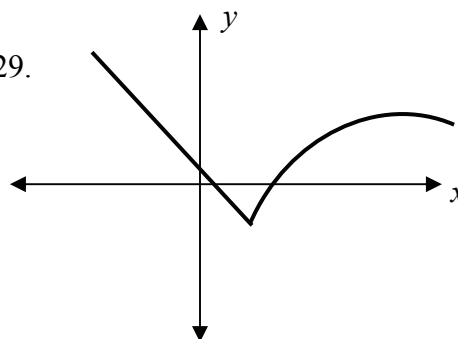
27.

x	y
-2	-1
-1	0
0	3
1	7
3	2
5	6
9	4

28.



29.



For items 30 and 31, complete the tables so that the functions are linear.

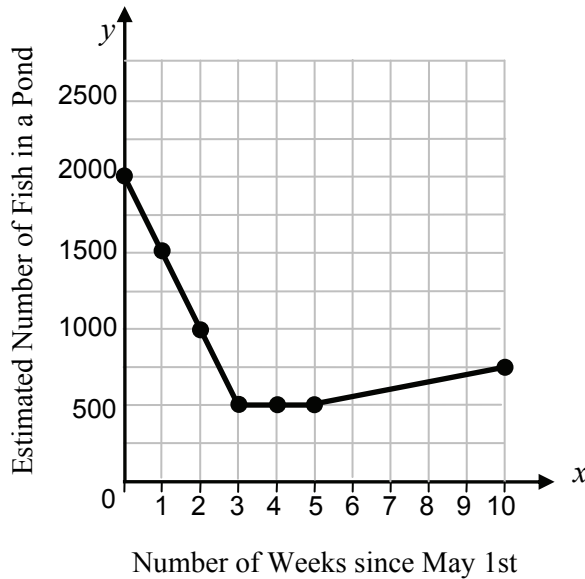
30.

x	y
-3	5
-2	3
-1	
0	
1	
2	
3	

31.

Number of Cups of Juice Concentrate, x	Number of Cups of Water, y
0	0
1	
2	3
3	
4	
5	
6	

32. Look at the graph below.



- What are the units of measurement for the rate of change?
- Over what intervals does there appear to be a constant rate of change?
- Write a piecewise function, $f(x)$ that represents the estimated number of fish in the pond each week since May 1st.

$$f(x) = \left\{ \begin{array}{l} \\ \\ \\ \end{array} \right.$$

- Fill in the blanks to explain the practical meaning of the slope of the piecewise function.

During the weeks _____, the fish population changed at a rate of _____ fish per week.
 During the weeks _____, the fish population changed at a rate of _____ fish per week.
 During the weeks _____, the fish population changed at a rate of _____ fish per week.

- What is the average rate of change over the interval $x = 1$ to $x = 5$?
- What is the practical meaning of the value you obtained in (e)?

For items 33 and 34, match appropriate parts of the contexts and questions below with the corresponding equation from the equation bank. If a statement or question does not correspond with any equation in the bank, write “no equation.”

Equation Bank for items 33 and 34:		
I. $x + y = 5$	II. $y = 2300 + 400x$	III. $y = 400 + 2300x$
IV. $2300x + 400y = 5800$	V. $y = 2300 + 400(5)$	VI. $5800 = 2300 + 400x$

33.

- Lisa sells x computers for \$2300 each and y printers for \$400 each.
- Altogether, Lisa sold computers and printers for a total of \$5800.
- Lisa sold 5 items.

34.

- Cheri had \$2300 in her savings account at the beginning of the year. Each month, she deposits \$400. Let y = the amount of money Cheri has saved in x months since the beginning of the year.
- When will Cheri have \$5800?
- How much money, y , will Cheri have after 5 months?

35. The edge of a historic house is near a steep cliff. The local historical society is concerned about erosion and keeps track of the distance from the house to the edge of the cliff. The following is a table of information.

Number of Years, x, since 1975	0	5	10	15	20	25	30
Distance, y, From House to Edge of Cliff (feet)	26.00	24.60	23.25	21.90	20.70	19.60	18.25

You have been hired by the historical society to model the data and predict when the cliff will erode to the edge of the house.

- Determine the equation of the regression line. Round your numbers to three places after the decimal point.
- What is the value of the slope in your regression line?
- What is the practical meaning of slope in this context?
- What is the value of the y -intercept in your regression line?
- What is the practical meaning of the y -intercept in this context?
- According to your regression equation, how many feet will the edge of the cliff be from the house in the year 2015?
- According to your regression equation, when will the cliff have eroded to the edge of the house?

36. Select the graph that matches each equation.

Equations

a. $y = 10 + \frac{10}{3}x$

b. $3y = 10x$

c. $3y = 30 - 10x$

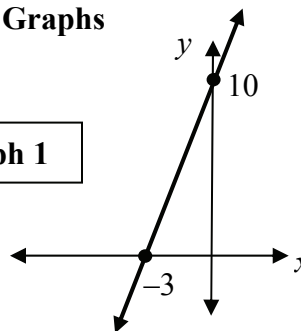
d. $10x - 3y = 0$

e. $y = \frac{3}{10}x$

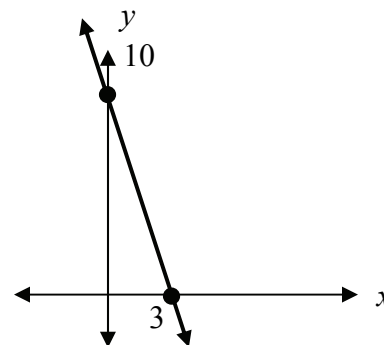
f. $10x + 3y = 30$

Graphs

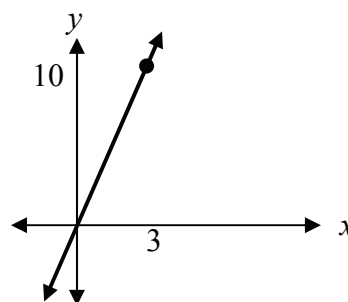
Graph 1



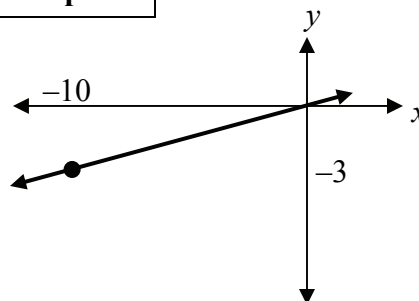
Graph 2



Graph 3



Graph 4



37. Solve the system of linear equations.
$$\begin{cases} 3x - y = 5 \\ 2x + 5y = -8 \end{cases}$$

38. Solve the system of linear equations.
$$\begin{cases} y = 2x - 8 \\ 3x + 4y = 12 \end{cases}$$

39. Examine the following system of equations:
$$\begin{cases} 6x + 8y = 26 \\ 3x + 4y = 13 \end{cases}$$

- a. How many solutions are there to this system of equations?
- b. What is/are the solutions?

40. Examine the following system of equations:
$$\begin{cases} y = \frac{5}{7}x - 9 \\ y = \frac{5}{7}x + 3 \end{cases}$$

- a. How many solutions are there to this system of equations?
- b. What is/are the solutions?

41. Victor is offered two jobs. Computer Industries will pay Victor a \$3,000 sign-on bonus plus \$1,250 per week. Ideal Imaging will pay Victor \$1,600 per week.
- Model Victor's situation with Computer Industries using a linear equation.
 - What is the y -intercept and what is its practical meaning in this context?
 - What is the slope and what is its practical meaning in this context?
 - Model Victor's situation with Ideal Imaging using a linear equation.
 - What is the y -intercept and what is its practical meaning in this context?
 - What is the slope and what is its practical meaning in this context?
 - Write the equations for Victor's situation with Computer Industries and with Ideal Imaging as a system of equations.
 - Solve the system of equations.
 - What is the practical meaning of the solution to the system of equations?

42. In the morning, Lisa exercised for 6 miles along a 6-mile trail. Lisa knows that she jogs at a steady pace of 15 minutes per mile, and walks at a steady pace of 25 minutes per mile. Lisa completed the 6-mile trail in 110 minutes. She wants to figure out the distance she jogged, x , and the distance she walked, y .
- Write a system of linear equations that represents Lisa's exercise situation.
 - Write a matrix equation to represent Lisa's exercise situation.
 - Solve the system of equations.
 - What is the practical meaning of the solution to the system of equations?
43. Your soccer team wants to promote school spirit so it decides to sell T-shirts and sweatshirts in both medium and large sizes. Matrix A represents the number of T-shirts and sweatshirts your team sells in the two sizes. Matrix B represents the cost of each item.

$$A = \begin{array}{l} \text{T's} \\ \text{Sweats} \end{array} \begin{array}{c} \text{Sizes} \\ \text{Med} \quad \text{Large} \\ \begin{bmatrix} 12 & 35 \\ 14 & 27 \end{bmatrix} \end{array} \qquad B = \begin{array}{l} \text{Medium} \\ \text{Large} \end{array} \begin{array}{c} \text{Cost} \\ \begin{bmatrix} 12.50 \\ 26.40 \end{bmatrix} \end{array}$$

- Determine the product matrix that represents the amount of money the soccer team collects selling T shirts and sweatshirts. Label the rows and columns of the product matrix.
- How much total money is collected by the team?

44. Choose the correct graph for each system of inequalities.

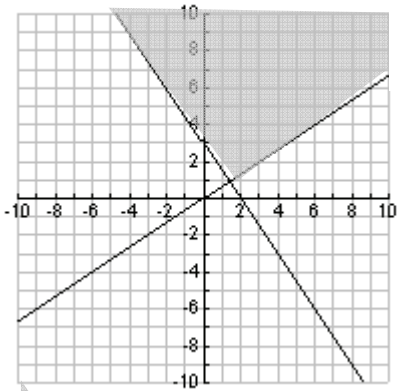
a.
$$\begin{cases} y \geq \frac{2}{3}x \\ y \leq -\frac{3}{2}x + 3 \end{cases}$$

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

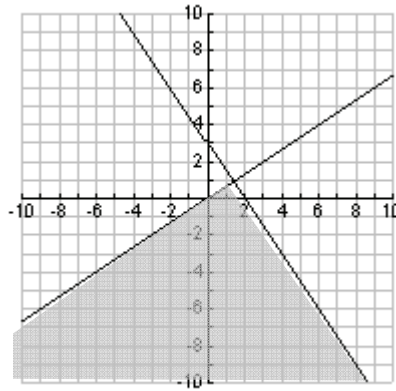
c.
$$\begin{cases} y \leq \frac{2}{3}x \\ y \leq -\frac{3}{2}x + 3 \end{cases}$$

d.
$$\begin{cases} y \leq \frac{2}{3}x \\ y \geq -\frac{3}{2}x + 3 \end{cases}$$

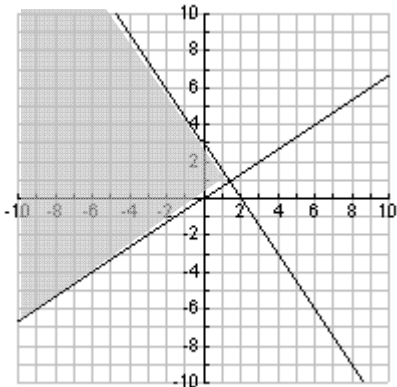
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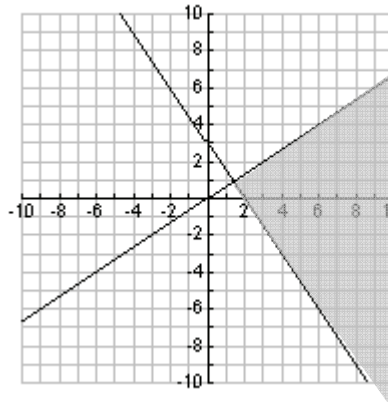
II



III



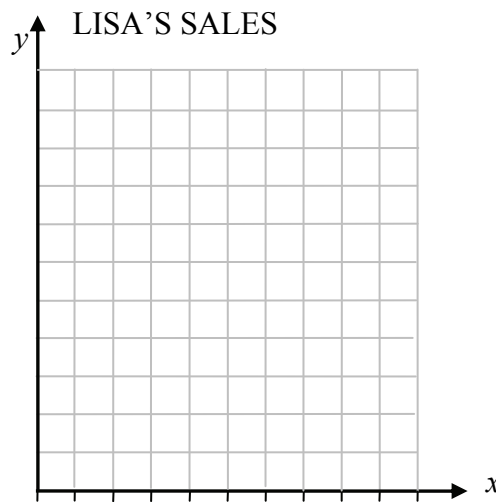
IV



45. Lisa must sell at least 20 items this month. Computers now cost \$2,400 and printers still cost \$400. Lisa also must sell a total of at least \$20,000 worth of merchandise this month.

Let x represent the number of computers.
 Let y represent the number of printers.

- a. Write a system of linear inequalities to represent Lisa’s situation.
- b. Graph the solution to the system of inequalities.



- c. Write 3 combinations of selling computers and printers that will work for Lisa’s situation.

46. Daniel saw the following sign at the ice cream stand on the beach.

ICE CREAM SANDWICHES

Your first 5 sandwiches are \$2 each.
Each sandwich after that costs \$1 each!

Let x = number of ice cream sandwiches
 Let y = total cost for x ice cream sandwiches

Write an appropriate piecewise function that represents the situation.

For items 47 through 49 use the following matrices.

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$$

47. a. Determine $A + B$. What are the dimensions of $A + B$?
- b. Determine $B + A$. What are the dimensions of $B + A$?
- c. What do you notice about the answers for parts (a) and (b) above?
48. a. Determine $A - B$. What are the dimensions of $A - B$?
- b. Determine $B - A$. What are the dimensions of $B - A$?
- c. What do you notice about the answers for parts (a) and (b) above?
49. a. Determine AB . What are the dimensions of AB ?
- b. Determine BA . What are the dimensions of BA ?
- c. What do you notice about the answers for parts (a) and (b) above?

For items 50 through 52 use the following matrices.

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$$B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$$

$$C = \begin{bmatrix} 9 & 8 & 2 \\ 4 & 1 & 7 \end{bmatrix}$$

$$D = \begin{bmatrix} 10 \\ 3 \end{bmatrix}$$

50. a. Determine $\det A$
- b. Use $\det A$ to find A^{-1}
- c. Determine $A \cdot A^{-1}$
- d. Determine $A^{-1} \cdot A$
- e. What do you notice about the answers for parts (c) and (d) above?
51. a. What are the dimensions of the product matrix AC ?
- b. What are the dimensions of the product matrix $B^{-1}C$?
- c. What are the dimensions of the product matrix CA ?
- d. What are the dimensions of the product matrix AD ?
52. a. Determine $A^{-1}C$. What are the dimensions of the product matrix $A^{-1}C$?
- b. Determine $B^{-1}D$. What are the dimensions of the product matrix $B^{-1}D$?