Name:_____ Period_____ Date:_____

Honors Algebra 1 - Fall Final Review

This review packet is <u>due at the beginning of your final exam</u>.

In addition to this packet, you should study each of your unit reviews and your notes. For extra practice, you could even redo some problems from the reviews. Your grade is up to YOU!

<u>Part 1</u>

1. Simplify: $2x^3 - 7 + 4x^2 + 6x - 7x^2 + 3 + 4x^3$

2. Add: a. $(2y^2 - 4y + 3) + (6y - 1)$ b. $(3a^2 + 4a - 3) + (6a^2 - 3a + 7)$

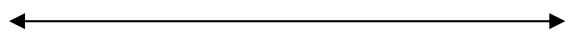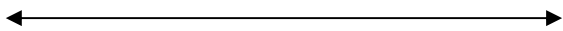**3.** Subtract: a. $(5x^2 + x - 7) - (-9x^2 - 4x + 2)$ b. $(7a^2 + 3a - 9) - (4a^2 - 6a - 10)$

4. Solve: $-|x - 4| + 2 = 8$ **5.** Solve: $2|x - 5| - 7 = -3$
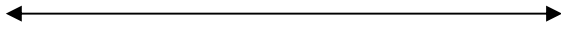
6. Solve and graph $-3|x - 8| \geq -12$ **7.** Solve and graph $4|x + 7| \leq -16$

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Interval notation: _____

8. Solve and graph $-4|m-6|+8 \geq -20$ **9.** Solve $3|x+4| = 18$

Interval notation: _____

10. Identify the properties shown below:

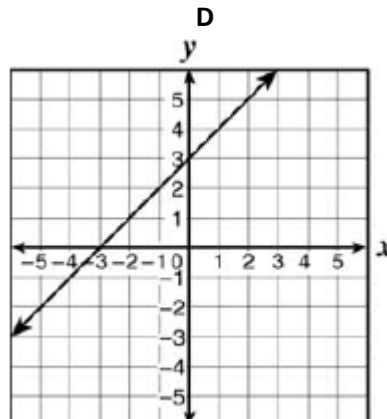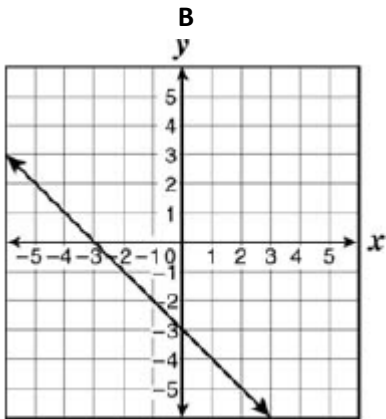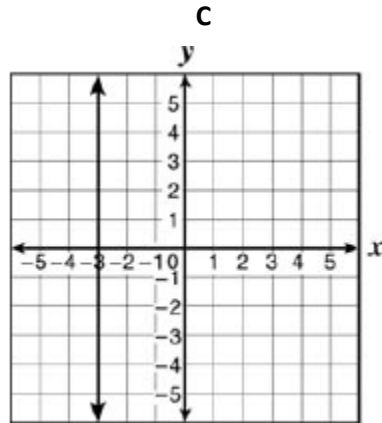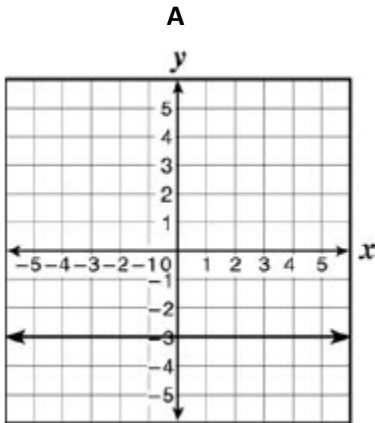   a. $x + (y + z) = (x + y) + z$ b. $m + n = n + m$

    c. $xy = yx$ d. $(pq)r = p(qr)$

    e. $x(m + n) = xm + xn$

11. Which BEST represents the line $x = -3$?

A

C

B

D

Part 2

Solve the following equations for x.

1. $2x - 5 = -43$

2. $\frac{2}{3}x - 7 = 11$

3. $\dfrac{x}{5} = \dfrac{x+6}{10}$

4. $-93 = 2(6x+1)+1$

5. $5(x+8) - 7 = 103$

6. $5a + 2 = 6 - 7a$

7. $3(3m-2) = 2(3m+3)$

8. $5[2 - 3(4+2x)] = -2(x-3)$

9. Given $-2 < 7x - 2 < 3$, which of these is __not__ a solution to the inequality?

a. x = ½   b. x = 1   c. x = 1/3   d. x = ¼
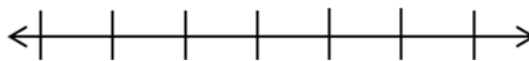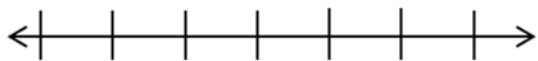
For 10 – 12: Solve, graph and write your answer in interval notation:

10. $-5x - 7 < 10x - 4$

11. $-3(x + 4) \le 6$

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12. $x - 4 \le 5$ or $3x > 36$

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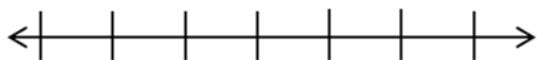
13. Draw a graph on a number line that represents the interval $(3, \infty)$?

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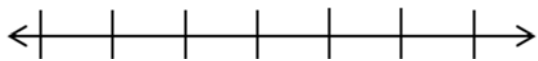
14. Did you know that you can get a ticket for going too slow or too fast? On one stretch of road, you need to go 30 to 45 miles per hour to avoid a ticket. Write an inequality that describes this situation, where r represents the speed.

15. Solve each of the following literal equations for c.

a. $\dfrac{c}{b} - x = 2d$

b. $ac + bd = x$

Part 3

1 & 2. *Sketch the graph of the inequality or system of inequalities.*

1

$y \geq 2x - 1$

2

$) \; y < -3x - 1$
$\qquad y \geq x + 3$
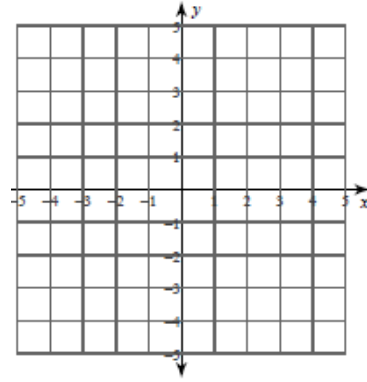
3. Describe the graph of the linear inequality: $y \leq -3x - 4$

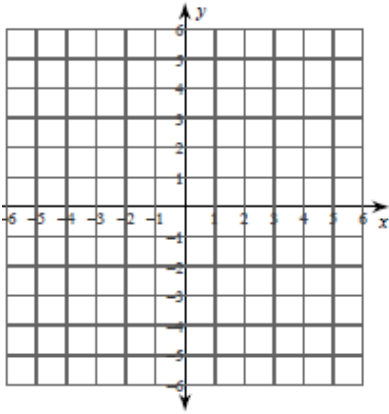*For 4 and 5: You are buying jeans and t-shirts. Jeans cost \$35 and shirts cost \$15. You plan on spending no more than \$135 and getting at least 5 items.*

4 . Which of the following systems can be used to represent the above situation?

a.
$x + y \leq 5$
$35x + 15y \leq 135$

b.
$x + y < 5$
$35x + 15y > 135$

c.
$x + y \geq 5$
$35x + 15y < 135$

d.
$x + y \geq 5$
$35x + 15y \leq 135$

5. Which of the graphs below represent the set of possible solutions (#of jeans and # of shirts)?

a.

jeans

b.

jeans

c.

jeans

d.

jeans
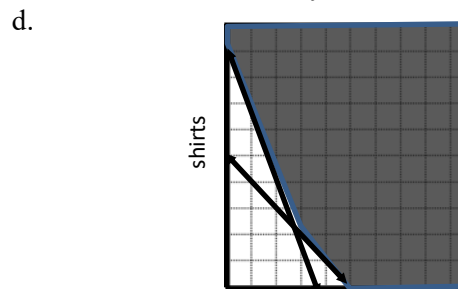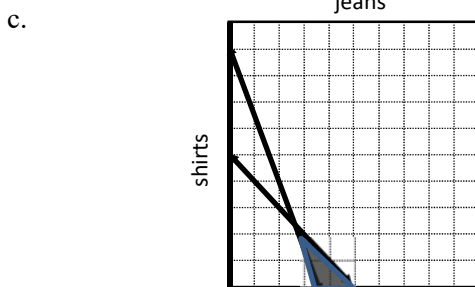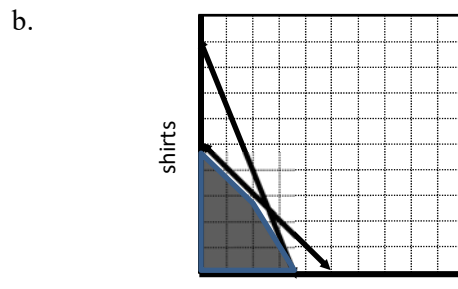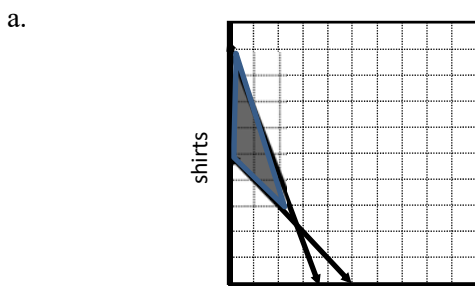
6 and 7: Solve the following systems by graphing:

6. $y = 2x + 1$

$x = -2$
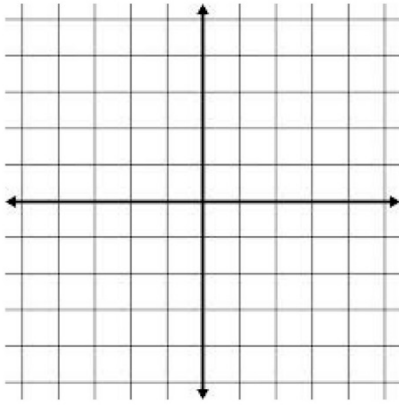
7. $y = -2x + 3$

$2x + y = 5$
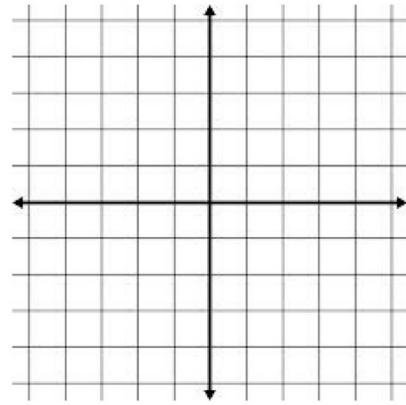
8 and 9: Solve each system using substitution or elimination.

8.
$2x + 5y = -16$
$6x + y = -20$

9.
$3x - 5y = 10$
$-6x + 10y = -20$

10. Samantha is doing chores at home. She can vacuum a room for $2 or wash and fold a load of laundry for $3. One month she accomplished 25 chores and earned a total of $64. Write a system of equations to model the situation, and then determine how many of each type of chore she did that month.

11. When does a system of equations have no solution? When does a system have infinite solutions?

Give an example of each.

12. Write the equation $4x + 3y = 9$ in slope-intercept form.

13. Which of the equations below fits the restrictions $x \neq 4$ and $x \neq -7$?

A. $\dfrac{5}{x-4} = \dfrac{3}{x+7}$

B. $\dfrac{x-4}{5} = \dfrac{x+7}{3}$

C. $\dfrac{5}{x+4} = \dfrac{3}{x+7}$

D. $\dfrac{5}{x-4} = \dfrac{3}{x-7}$

Write a system of inequalities for #14 and 15 below.
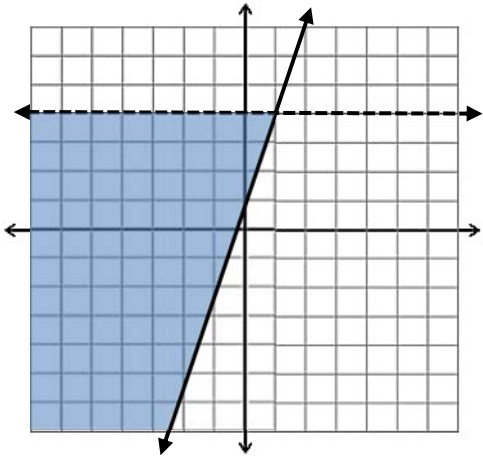
14.   **15.**
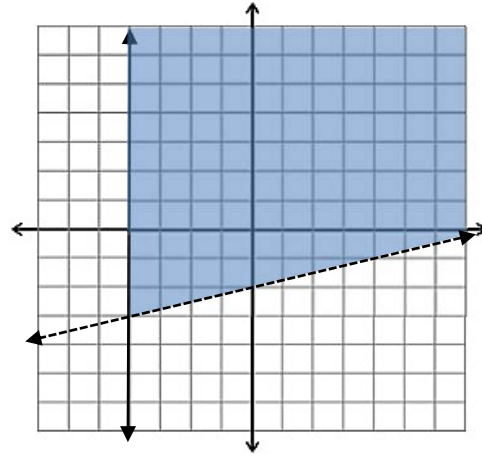
Part 4

1. Which five statistics do we always use when creating a box plot? Write them in order.

2. Determine which of the following are true and which are false. Explain your conclusion.

    a. Standard deviation is a measure of spread.

    b. The smaller the standard deviation means the data is more spread out.

    c. The IQR is calculated by subtracting the minimum from the maximum

    d. The range of a set of data is always 100.

3. What is one advantage of graphically displaying data with a dot plot?

4. Determine which of the following are true and which are false. Explain your conclusion.

   a. A box plot divides the distribution into ¼'s

   b. Histograms do not retain the original data in the distribution.

   c. A histogram will not be misleading even if the columns are not equal widths.

   d. Box plots are a good graphical representation to use if there are outliers in the distribution because the median is resistant to outliers.

   e. On a box plot, outliers are 1.5xIQR (or more) away from Q1 and Q3 – and are often marked with a star or asterisk.

5. What percentage of a given set of data is included from Q1 to Q3? From Q1 to max?

6. If you collect data on the number of hours spent studying, and your standard deviation is 2.6 hours, how would the standard deviation change if every person studied an extra 3 hours?

**7.** One hundred people were interviewed and classified according to their attitude toward small cars and their personality type. Answer questions #22-26 using the results shown in the table below.

		Personality Type		
		Type A	Type B	Total
Attitude	Positive		12	37
Toward	Neutral	11	9	20
Small Cars	Negative	24		43
	Total	60	40	100

   a. Fill in the empty boxes.

   b. How many of those surveyed have a positive attitude toward small cars?

   c. What proportion of those surveyed have a positive attitude towards small cars?

   d. What is the probability that someone will have a neutral attitude towards small cars, given they are Type A?

   e. What is the probability that someone is a Type A personality given they have a negative attitude towards small cars.

8. A botanist is studying the petal lengths, measured in millimeters, of two species of lilies. The boxplots below illustrate the distribution of petal lengths from two samples of equal size, one from species A and the other from species B.

Petal Length (mm)
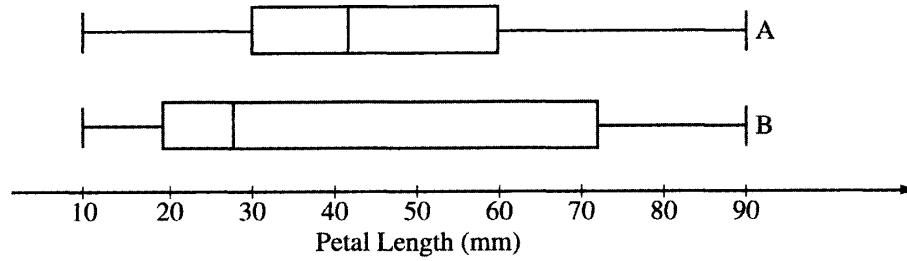
a. Which one of the species of lilies has a greater interquartile range?	**b.** Which one of the species of lilies has a smaller range?
c. Which one of the species has more petal lengths that are less than 30 mm?	**d.** If 101 lilies are measure from species A, how many had petal lengths less than 30mm?

e. If a lily from Species A has petals that are 60 mm long, which of these points represents this lily – minimum, 1st quartile, median, 3rd quartile, or the maximum?

Use the graph on the right for 9-10
9. What is the range of B? What is the approximate IQR of B? How many outliers does B have?
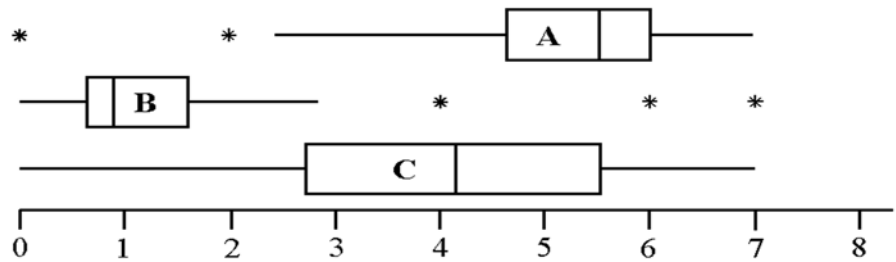
10. If each sample was of equal size, is it true that there is more data less than 5 in C than A?

11. The Histogram below shows the birth weight of lambs. How many lambs were under 1.7 kg?
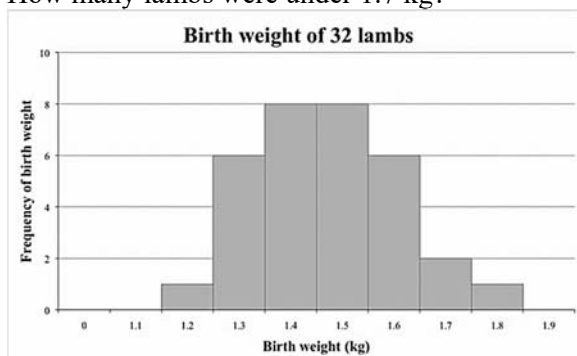
12. During a study with pigs the mean and median weights were calculated to be as follows:

Mean: 285   Median: 260

What does this tell us about our data?

13) Draw a box-and-whisker plot for the following men's heights (in inches): 64, 64, 67, 67, 69, 71, 71, 71, 71, 71, 72, 73, 73, 73, 76, 76, 79.

(a) What is the 5-number summary for this data?

Minimum = _____; Q1 = _____; Median = _____; Q3 = _____; Maximum = _____

14) Use the box plot from #13 to answer the following questions.

(a) What percent of the men's heights falls between 68 and 73 inches?

(b) What percent of the men's heights falls between 68 and 79 inches?

(c) What percent of the men's heights falls between 64 and 68 inches?

Part 5

Use the graph on the right to answer questions 1 – 5

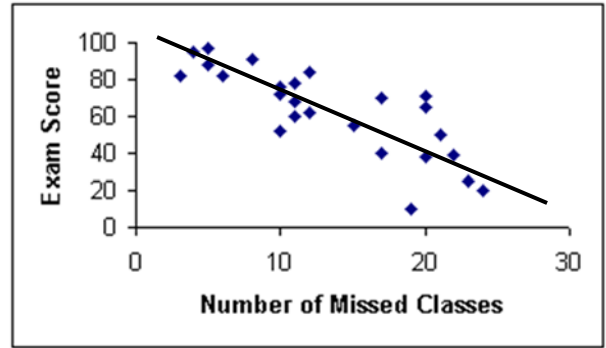**1.** a. If a student missed 20 classes, what is their predicted exam score?

b. If a student scored an 80 in their exam, what is their predicted number of missed classes?

2. Pick the best correlation coefficient: -1, -0.7, -0.3, 0.3, 0.7, or 1.

3. Generally, if a student missed more classes, was their exam score higher or lower?

4. For students that missed **less than** 10 classes, all scored in what range?

5. Consider the student that missed 19 classes and scored a 10% on the exam. If you found a line of best fit, created a residual plot, and found that the residual for this student was -19.2, what does that mean?

6. Suppose the standard deviation of "Number of Missed Classes" is 7.8. Explain what that means.

7. Suppose the standard deviation of "Exam Score" is 22. Explain what that means.

8. If all of the students increased their scores by 5%, what would happen to the standard deviation?
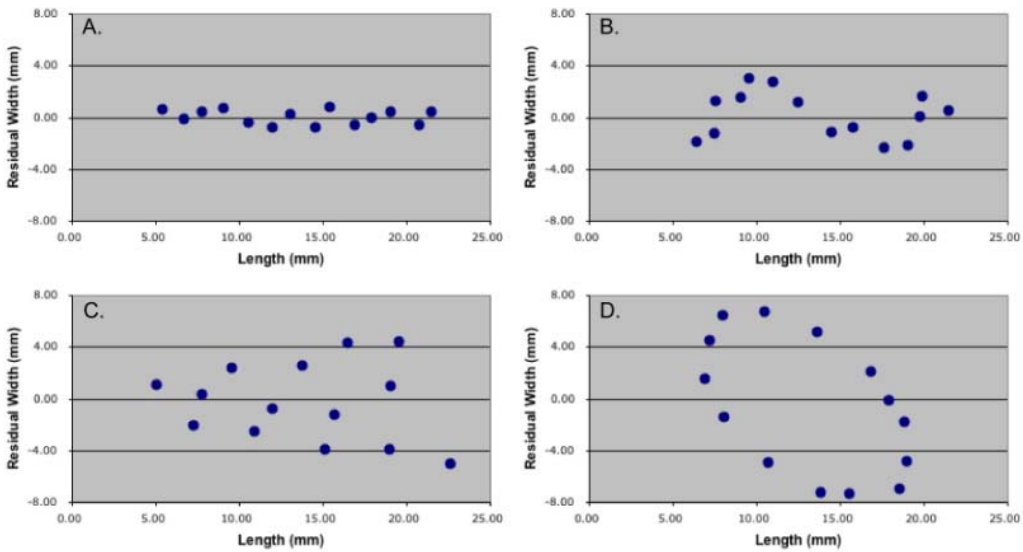
9. Which 2 residual plots above show that a line would be a good function to represent the data? Why?

10. What is a correlation coefficient?

11. Based on the residual plot describe the meaning of the farthest left point. The original data compared tree age in years to height in feet.
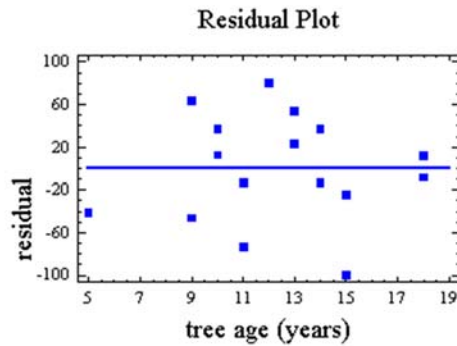
Residual Plot

12. Greg wrote an equation predicting how a population of rabbits in a park would change over time. Then he collected data on how the population really changed. This plot shows the residuals comparing the observed and predicted values.
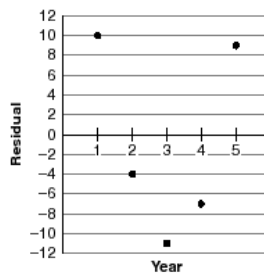
Based on the residuals, which graph shows Greg's actual prediction (line) and data (points)?

A.

B.

C.

D.
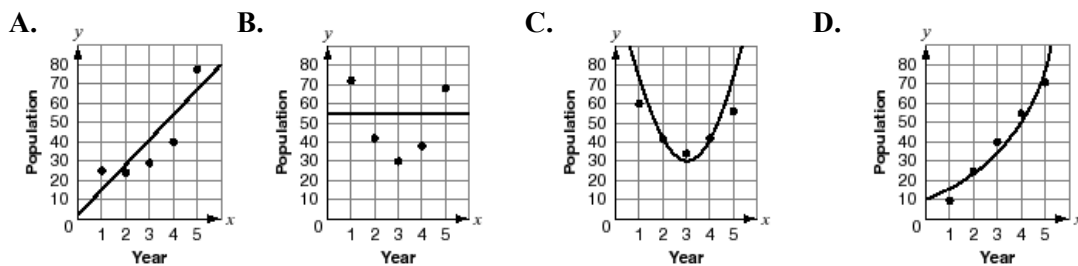
Part 6

Find the determinant.

1. $\begin{bmatrix} 2 & 3 \\ -3 & 7 \end{bmatrix}$

2. $\begin{bmatrix} -8 & 0 \\ -1 & 5 \end{bmatrix}$

Use the matrices below to simplify each of the following, #3-6.

$$A = \begin{bmatrix} 2 & 9 \\ 1 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}, \quad C = \begin{bmatrix} -2 & -6 \\ 7 & 5 \end{bmatrix}$$

3. $A + B$

4. $7B$

5. $B - 2C$

6. A^2

7. Given that $G = \begin{bmatrix} -6 & -1 \\ 2 & -7 \end{bmatrix}$, and $G\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 6 \\ -2 \end{bmatrix}$, solve for x and y.

Use the following matrix for #8-11. It shows the number of children, adults, and seniors that attended a show on particular days of the week.

$$H = \begin{array}{c} \\ Children \\ Adults \\ Seniors \end{array} \begin{array}{cccc} Wed & Th & Fri & Sa \\ \left| \begin{array}{cccc} 12 & 25 & 23 & 21 \\ 34 & 47 & 56 & 67 \\ 15 & 21 & 40 & 34 \end{array} \right| \end{array}$$

8. What is in the cell $h_{2,3}$?

9. What cell is the number "15" in?

10. How many seniors went to the show on Friday?

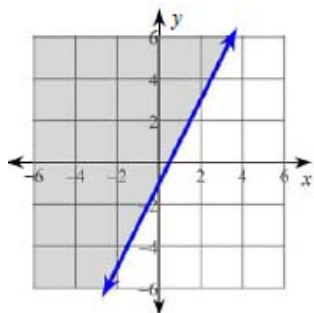**11.** How many adults went to the show on Thursday?

Part 1 Answers

1. $6x^3 - 3x^2 + 6x - 4$	**2.** a. $2y^2 + 2y + 2$ b. $9a^2 + a + 4$	**3.** a. $14x^2 + 5x - 9$ b. $3a^2 + 9a + 1$
4. No Solution	**5.** x = 7, 3	**6.** $x \le 12$ *and* $x \ge 4$ $4 \le x \le 12$ 4 12
7. No Solution	**8.** [-1, 13], see graph $-1 \le m \le 13$	**9.** x = 2, -10
10. a. associative of addition b. commutative of addition c. commutative of multiplication d. associative of multiplication e. distributive		**11.** C

Part 2 Answers

1. x= -19	**2.** x = 27	**3.** x=6
4. x= -8	**5.** x=14	**6.** a = 1/3
7. m= 4	**8.** x= -2	**9.** b
10. x > -1/5; (-1/5, ∞); open circle on -1/5 colored to the right.	**11.** x $\ge$ -6; [-6, ∞); closed circle on -6 colored to the right.	**12.** x$\le$9 or x >12; (-∞ , 9]U(12, ∞); Closed circle on 9 colored to the left and open circle on 12 colored to the right.
13. 3	**14.** $30 \le r \le 45$	**15.** a. $c = 2bd + bx$ b. $c = \dfrac{x - bd}{a}$

Part 3 Answers

1.	**2.**
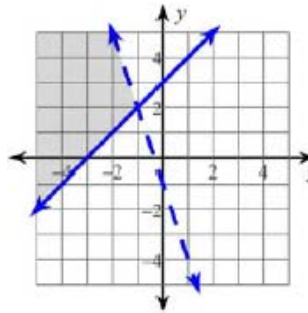
3. A solid line, with a slope of -3, shaded in below the line.	**4.** D	**5.** A
6. (-2, -3)	**7.** No solution	**8.** (-3, -2)
9. Infinitely Many Solutions	**10.** V + L = 25 and 2V + 3L = 64: 11 rooms and 14 loads of laundry	**11.** Sample answers: Inf solutions: x+5y=10, 2x+10y=20 No Solution: x+2y=10, 2x+4y=15
12. $y = -\frac{4}{3}x + 3$	**13.** A	**14.** $y < 4$ $y \ge 3x + 1$
15. $x \ge -4$ $y > \frac{1}{4}x - 2$		

Part 4 Answers

1. Minimum, Q1, median, Q3, maximum	**2.** a. True. It explains how spread out or condensed a given distribution is/a given set of data is. It is typically used with the mean in histograms.	**2.** b. False. A small standard deviation means the data is less spread out (is closer together)
2. c. False. It is a measure of spread typically used with boxplots that is calculated by Q3 – Q1.	**2.** d. False. The range can be any non-negative value. It is calculated by maximum – minimum.	**3.** The original data is retained (unlike a histogram or a box plot, where the original data is lost/cannot be identified).
4. a. True. A box plot is divided into quartiles, which means quarters, 4th's.	**4.** b. True. A dot plot or a stem plot do retain original data though.	**4.** c. False. The columns must be the same width (so each class is 3 wide, or each class is 5 wide, etc.) or it will indeed be misleading.
4. d. True. The median is not influenced by outliers (this quality is called resistant). So if you have a distribution with an outlier (s), it is wise to display your distribution graphically using a box plot.	**4.** e. True.	**5.** 50% . 75%
6. The standard deviation would not change, because the entire set of data would shift up 3 hours, but the spread would not change.	**7.** a. Positive Type A = 25; Negative Type B = 19;	**7.** b. 37
7. c. 37/100	**7.** d. 0.18	**7.** e. 0.56
8. a. Species B	**8.** b. Both are about the same.	**8.** c. Species B. (at least 50% of species B are less than 30, while only 25% of species A are less than 30).
8. d. 25	**8.** e. 3rd quartile	**9.** range = 7, IQR = 0.9, 3 outliers
10. Yes, it's true.	**11.** 29	**12.** When the mean and median are different, the data are skewed in some way.

13)
  (a) Minimum = 64; Q1 = 68; Median = 71; Q3 = 73; Maximum = 79
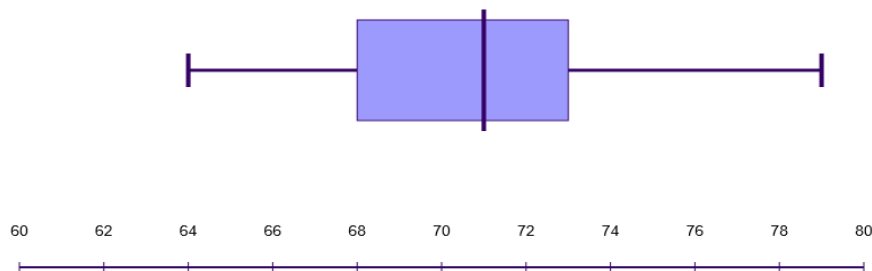
14)   (a) 50%   (b) 75%   (c) 25%

Part 5 Answers

1. a. score of 40 b. 9 missed classes	**2.** -0.7	**3.** Lower
4. 80-100	**5.** They scored 19.2% lower than expected	**6.** Answer may vary
7. Answer may vary	**8.** The standard deviation would not change	**9.** A and C; there are points randomly scattered above and below the residual line.
10. Shows us the strength and direction of a relationship (the closer to 0 means it is not a strong relationship, close to 1 is a strong positive relationship, and close to -1 is a strong negative relationship)	**11.** A 5 year old tree was 40 ft less than predicted.	**12.** A

Part 6 Answers

1. 23	**2.** -40	**3.** $\begin{bmatrix} 3 & 9 \\ 1 & 2 \end{bmatrix}$	**4.** $\begin{bmatrix} 7 & 0 \\ 0 & -7 \end{bmatrix}$
5. $\begin{bmatrix} 5 & 12 \\ -14 & -11 \end{bmatrix}$	**6.** $\begin{bmatrix} 13 & 45 \\ 5 & 18 \end{bmatrix}$	**7.** $x = -1$ and $y = 0$	**8.** 56
9. $h_{3,1}$	**10.** 40 seniors	**11.** 47 adults	