Name: Key Period_____ Date:_____

Honors Algebra 1 - Fall Final Review

This review packet is due at the beginning of your final exam.

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!

Part 1

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

$6x^3 - 3x^2 + 6x - 4$

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

$2y^2 - 4y + 3 + 6y - 1$

$2y^2 + 2y + 2$

b. $(3a^2 + 4a - 3) + (6a^2 - 3a + 7)$

$9a^2 + a + 4$

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

$5x^2 + x - 7 + 9x^2 + 4x - 2$

$14x^2 + 5x - 9$

b. $(7a^2 + 3a - 9) - (4a^2 - 6a - 10)$

$7a^2 + 3a - 9 - 4a^2 + 6a + 10$

$3a^2 + 9a + 1$

4. Solve: $-|x - 4| + 2 = 8$

$-|x - 4| = 6$

$|x - 4| = -6$

No solution

5. Solve: $2|x - 5| - 7 = -3$

$2|x - 5| = 4$

$|x - 5| = 2$

$x - 5 = 2$ $\quad$ $x - 5 = -2$

$x = 7$ $\quad$ $x = 3$

6. Solve and graph $-3|x - 8| \geq -12$

$|x - 8| \leq 4$

$x - 8 \leq 4$ and $x - 8 \geq -4$

$x \leq 12$ $\quad$ $x \geq 4$

$4 \leq x \leq 12$

Interval notation: [4, 12]

7. Solve and graph $4|x + 7| \leq -16$

$|x + 7| \leq -4$

No solution

8. Solve and graph $-4|m-6|+8 \geq -20$

$-4|m-6| \geq -28$

$|m-6| \leq 7$

$m-6 \leq 7$ and $m-6 \geq -7$

$m \leq 13$ $\quad m \geq -1$

$-1 \leq m \leq 13$

Interval notation: $[-1, 13]$

9. Solve $3|x+4| = 18$

$|x+4| = 6$

$x+4=6$ $\quad x+4=-6$

$x=2$ $\quad x=-10$

10. Identify the properties shown below:

a. $x + (y + z) = (x + y) + z$

Associative prop of addition

b. $m + n = n + m$

Commutative prop of addition

c. $xy = yx$

Commutative prop of multiplication

d. $(pq)r = p(qr)$

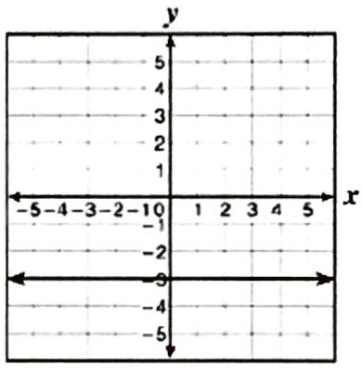
Associative prop. of multiplication

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

Distributive prop

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

A



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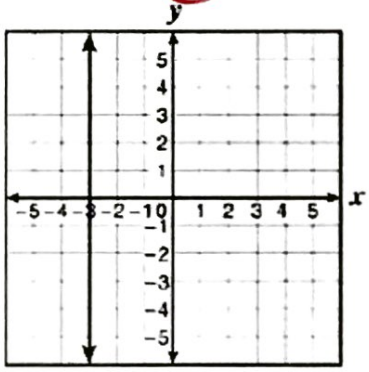

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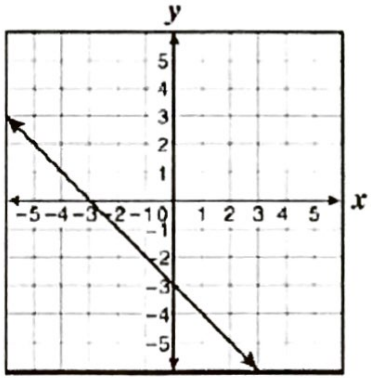

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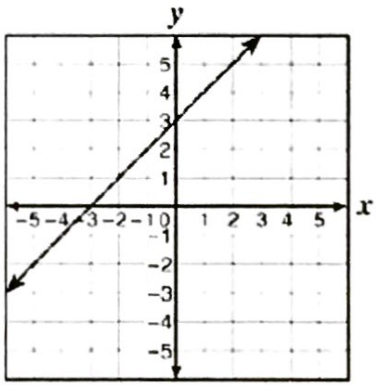


Part 2

Solve the following equations for x.

1. $2x-5=-43$

$2x = -38$

$x = -19$

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

$\frac{2}{3}x = 18$

$\left(\frac{3}{2}\right)\frac{2}{3}x = 18\left(\frac{3}{2}\right)$

$x = 27$

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

$10x = 5(x+6)$

$10x = 5x+30$

$5x = 30$

$x = 6$

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

$-93 = 12x+2+1$

$-93 = 12x+3$

$-96 = 12x$

$-8 = x$

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

$5x+40-7=103$

$5x+33=103$

$5x=70$

$x=14$

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

$+7a \quad +7a$

$12a+2=6$

$12a=4$

$a = \frac{4}{12} = \frac{1}{3}$

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

$9m-6=6m+6$

$3m=12$

$m=4$

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

$5[2-12-6x]=-2x+6$

$5(-10-6x)=-2x+6$

$-50-30x=-2x+6$

$-56=28x$

$-2=x$

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

$-2 < 7x-2 < 3$

$+2 \quad +2 \quad +2$

$\frac{0}{7} < \frac{7x}{7} < \frac{5}{7}$

$0 < x < \frac{5}{7}$

For 10 – 12: Solve, graph and write your answer in interval notation:

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

$-7<15x-4$

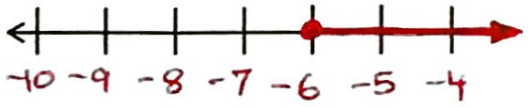
$-3<15x$

$-\frac{1}{5}<x$ $\quad (-\frac{1}{5},\infty)$

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

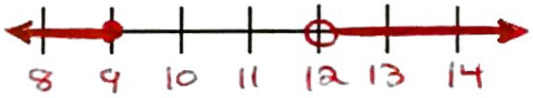
$x+4\ge -2$

$x\ge -6$ $\quad [-6,\infty)$

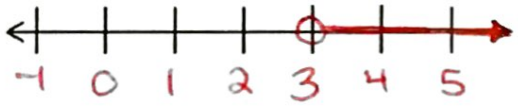


12. $x-4\le 5$ or $3x>36$

$x\le 9$ or $x>12$ $\quad (-\infty,9]\cup(12,\infty)$



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



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.

$30\le r\le 45$

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

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

$\frac{c}{b}=2d+x$

$c=b(2d+x)$

$c=2bd+bx$

b. $ac+bd=x$

$ac=x-bd$

$c=\frac{x-bd}{a}$

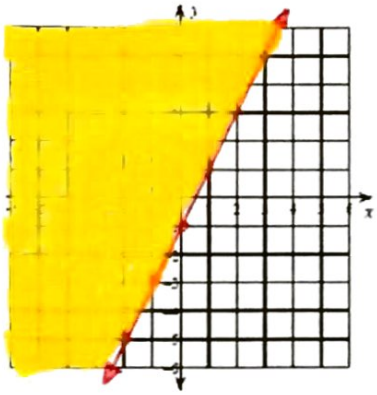
Part 3

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

1 $y \geq 2x - 1$

Test (0,0)

$0 \geq -1$ ✓

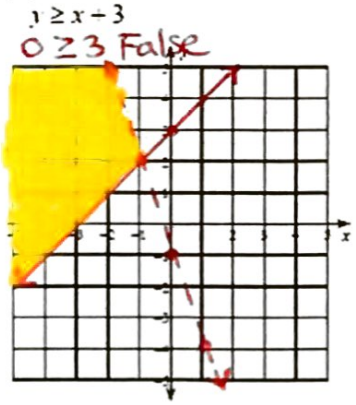


2 $y < -3x - 1$

$y \geq x - 3$

$0 < -1$ False

$0 \geq 3$ False



3. Describe the graph of the linear inequality: $y \leq -3x - 4$

- A solid line, $m = -\frac{3}{1}$ $b = -4$
- Shade below the line

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

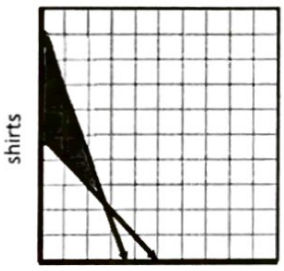
b. $x + y < 5$, $35x + 15y > 135$

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

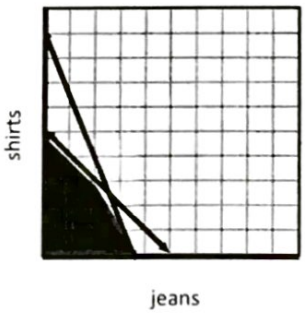
(d.) $x + y \geq 5$, $35x + 15y \leq 135$

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

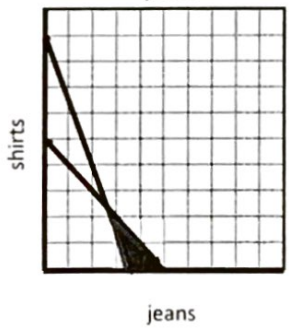
(a.)



b.



c.



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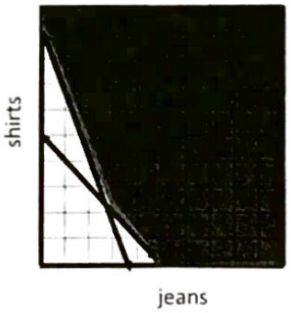
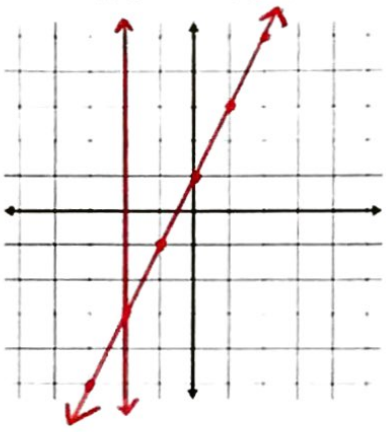


6 and 7: Solve the following systems by graphing:

6. $y = 2x + 1$

$x = -2$

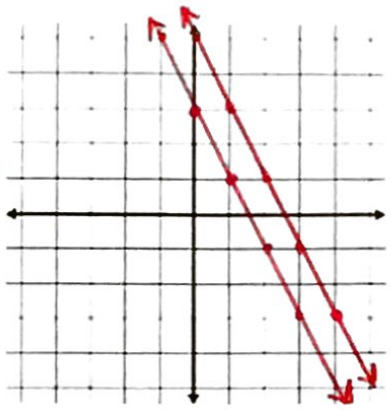


$(-2, -3)$

7. $y = -2x + 3$

$2x + y = 5$

$y = -2x + 5$



No solution

8 and 9: Solve each system using substitution or elimination.

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

$-5(6x + y = -20)$

$2x + 5y = -16$

$-30x - 5y = 100$

$-28x = 84$

$x = -3$

$2(-3) + 5y = -16$

$-6 + 5y = -16$

$5y = -10$

$y = -2$

$(-3, -2)$

9. $2(3x - 5y = 10)$

$-6x + 10y = -20$

$6x - 10y = 20$

$-6x + 10y = -20$

$0 = 0$

Infinitely many solutions

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.

$2x + 3y = 64$

$x + y = 25$

$y = 25 - x$

$2x + 3(25 - x) = 64$

$2x + 75 - 3x = 64$

$75 - x = 64$

$-x = -11$

$x = 11$ Vacuum

$y = 14$ laundry

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

No sol: $x + 2y = 10$, $2x + 4y = 15$ — same slope & diff y-intercepts

Give an example of each.

Inf: $x + 5y = 10$, $2x + 10y = 20$ — same slope & y-intercept

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

$3y = -4x + 9$

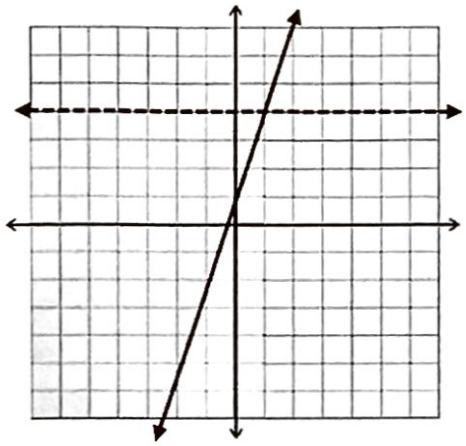
$y = -\frac{4}{3}x + 3$

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

A. $\frac{5}{x-4} = \frac{3}{x+7}$ B. $\frac{x-4}{5} = \frac{x+7}{3}$ C. $\frac{5}{x+4} = \frac{3}{x+7}$ D. $\frac{5}{x-4} = \frac{3}{x-7}$

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

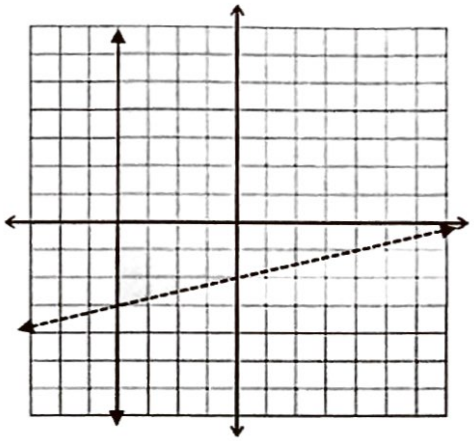
14.



$y < 4$

$y \geq 3x + 1$

15.



$x \geq -4$

$y > \frac{1}{4}x - 2$

Part 4

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

Min, Q_1, median, Q_3, max

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

a. Standard deviation is a measure of spread.

True, it measures how far away from the mean

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

False, small standard deviation means data is closer together

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

False, $Q_3 - Q_1$

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

False, Max − min.

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

You can identify individual data.

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

True, 4 quartiles.

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

True, histograms group data together.

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

False, columns must have equal width.

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

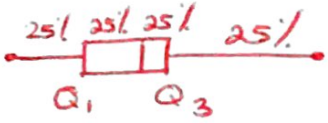
True, the outlier has no affect on the median.

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.

True (outliers)

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

50% → Q_1 to Q_3 75% → Q_1 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?

The standard deviation would not change.

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 Toward Small Cars	Positive	25	12	37
	Neutral	11	9	20
	Negative	24	19	43
	Total	60	40	100

a. Fill in the empty boxes.

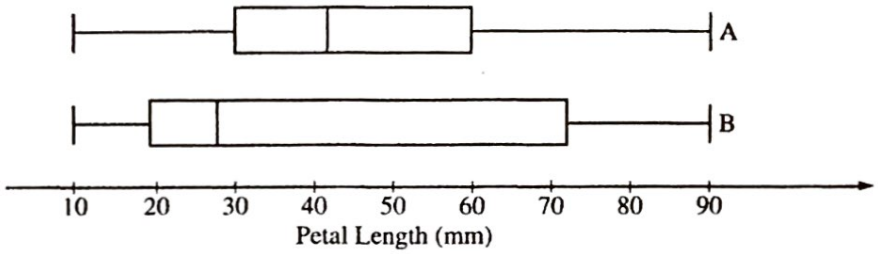
b. How many of those surveyed have a positive attitude toward small cars? 37

c. What proportion of those surveyed have a positive attitude towards small cars? $\frac{37}{100}$

d. What is the probability that someone will have a neutral attitude towards small cars, given they are Type A? $\frac{11}{60} \approx 0.18$

e. What is the probability that someone is a Type A personality given they have a negative attitude towards small cars. $\frac{24}{43} \approx 0.56$

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.



a. Which one of the species of lilies has a greater interquartile range?

Species B

b. Which one of the species of lilies has a smaller range?

Both are about the same.

c. Which one of the species has more petal lengths that are less than 30 mm?

Species B

d. If 101 lilies are measure from species A, how many had petal lengths less than 30mm?

25

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?

Q_3

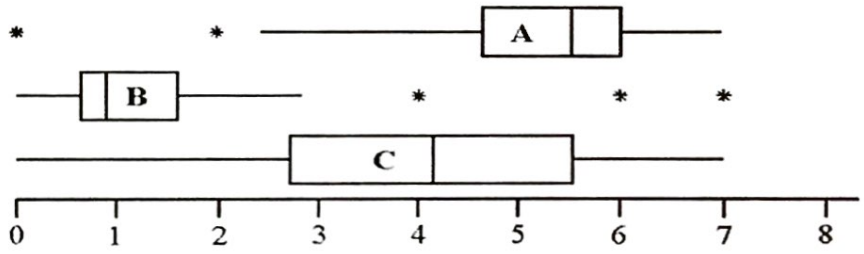
Use the graph on the right for 9-10

9. What is the range of B? What is the approximate IQR of B? How many outliers does B have?

Range (B) = 7-0 = 7

IQR (B) = 1.6-0.7 = 0.9

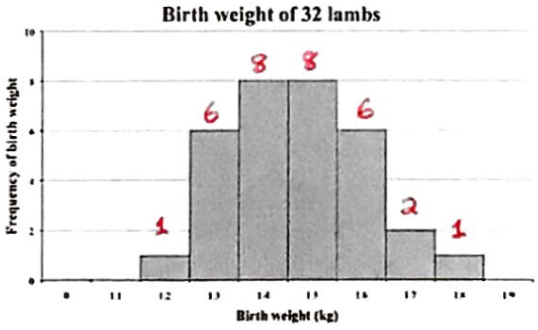
#outliers - 3



10. If each sample was of equal size, is it true that there is more data less than 5 in C than A?

True

11. The Histogram below shows the birth weight of lambs. How many lambs were under 1.7 kg?



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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?

The data might be skewed.

min Q_1 median

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.

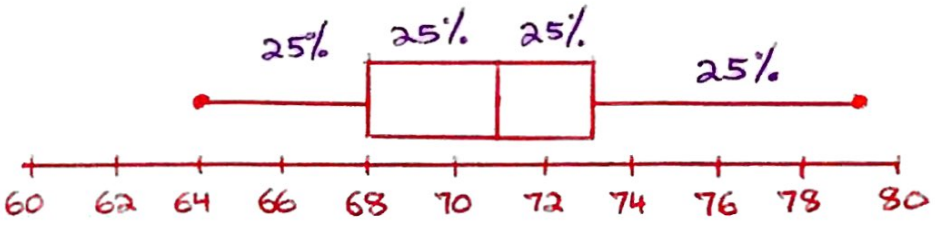
Min : 64

Q_1 : 68

Median : 71

Q_3 : 73

Max : 79



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

Minimum = 64 ; Q1 = 68 ; Median = 71 ; Q3 = 73 ; Maximum = 79

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

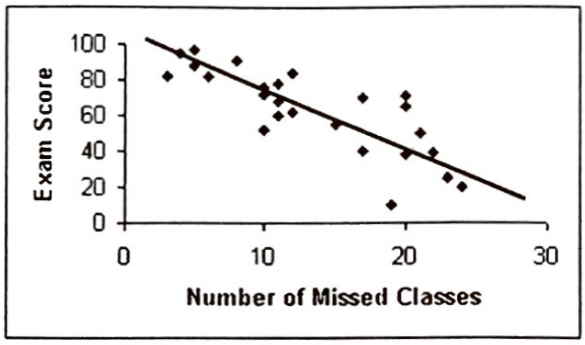
(a) What percent of the men's heights falls between 68 and 73 inches? 50%

(b) What percent of the men's heights falls between 68 and 79 inches? 75%

(c) What percent of the men's heights falls between 64 and 68 inches? 25%

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? 40 %

b. If a student scored an 80 in their exam, what is their predicted number of missed classes? 9 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?

Lower

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

Between 80-100

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?

The student scored 19.2% lower than expected.

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

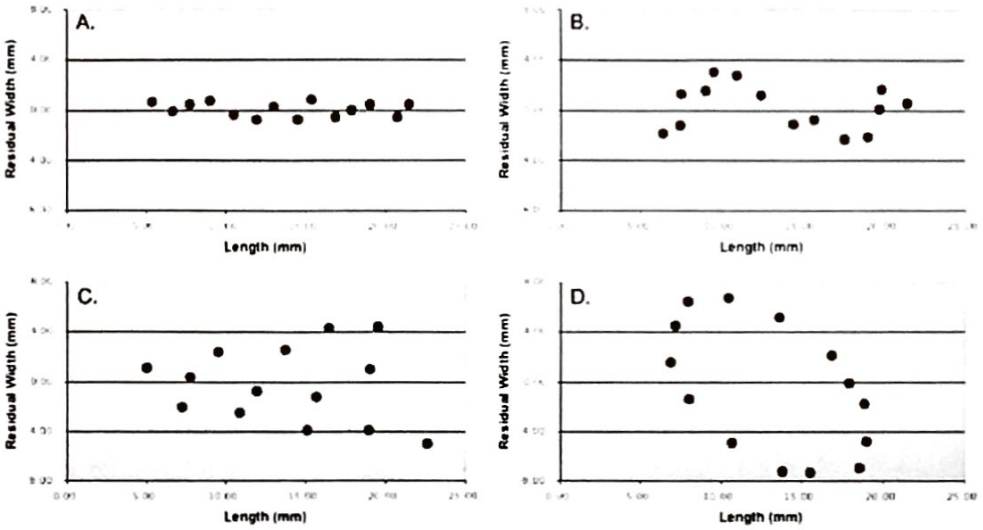
The majority number of missed classes is within 7.8 classes from the mean (average).

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

The majority of the students scored within 22% from the average.

8. If all of the students increased their scores by 5%, what would happen to the standard deviation?

The standard deviation would not change.



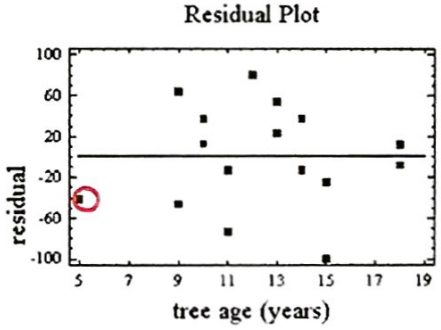
9. Which 2 residual plots above show that a line would be a good function to represent the data? Why?

A and C, points are randomly scattered below and above the residual line.

10. What is a correlation coefficient?

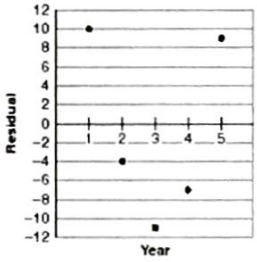
A number that determines the strength between two quantities.

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.



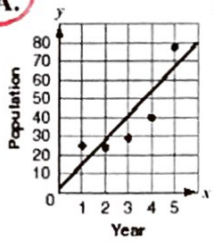
A 5-year old tree was 40 ft less than predicted.

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.

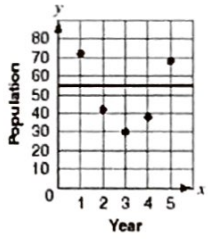


Based on the residuals, which graph shows Greg's actual prediction (line) and data (points)?

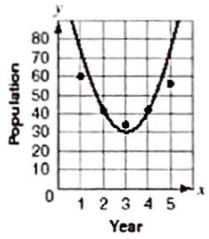
A.



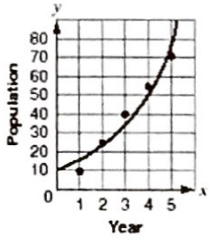
B.



C.



D.



Part 6

Find the determinant.

1. $\begin{bmatrix} 2 & 3 \\ -3 & 7 \end{bmatrix}$ $(2)(7)-(-3)(3)$ $14+9$ 23

2. $\begin{bmatrix} -8 & 0 \\ -1 & 5 \end{bmatrix}$ $(-8)(5)-(-1)(0)$ -40

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

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

3. $A+B$

$\begin{bmatrix} 2 & 9 \\ 1 & 3 \end{bmatrix}+\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}=\begin{bmatrix} 3 & 9 \\ 1 & 2 \end{bmatrix}$

4. $7B$ $7\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}=\begin{bmatrix} 7 & 0 \\ 0 & -7 \end{bmatrix}$

5. $B-2C$

$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}-2\begin{bmatrix} -2 & -6 \\ 7 & 5 \end{bmatrix}=\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}+\begin{bmatrix} 4 & 12 \\ -14 & -10 \end{bmatrix}=\begin{bmatrix} 5 & 12 \\ -14 & -11 \end{bmatrix}$

6. A^2

$\begin{bmatrix} 2 & 9 \\ 1 & 3 \end{bmatrix}$

$\begin{bmatrix} 2 & 9 \\ 1 & 3 \end{bmatrix}\begin{bmatrix} 4+9 & 18+27 \\ 2+3 & 9+9 \end{bmatrix}$

$=\begin{bmatrix} 13 & 45 \\ 5 & 18 \end{bmatrix}$

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.

$|G| = 42-(-2)$
$= 42+2$
$= 44$

$G^{-1}=\frac{1}{44}\begin{bmatrix} -7 & 1 \\ -2 & -6 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix}=\frac{1}{44}\begin{bmatrix} -7 & 1 \\ -2 & -6 \end{bmatrix}\begin{bmatrix} 6 \\ -2 \end{bmatrix}$

$=\frac{1}{44}\begin{bmatrix} -42-2 \\ -12+12 \end{bmatrix}=\frac{1}{44}\begin{bmatrix} -44 \\ 0 \end{bmatrix}=\begin{bmatrix} -1 \\ 0 \end{bmatrix}$ $x=-1$ $y=0$

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.

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

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

56

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

$H_{3,1}$

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

40 seniors

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

47 adults