MAT 035 Module 6 Practice Test Problems/Review for Final

1. Forty CEOs were surveyed and asked what kind of degree they had received. The results of the survey are shown in the table below.

Degree	Frequency	Relative Frequency
High School	2	5%
Bachelor's	7	17.5%
MBA	20	50%
Master's	3	7.5°
Law	4	10%
PhD	4	10%
	40	100%

a. Is the data in the table qualitative or quantitative?

qualitative

b. Complete the relative frequency table. State your answers in percents, **rounded to the nearest tenth of a percent**. Be sure to verify that your column sums to 100%.

above

c. What kind of graph would be appropriate to display the data in the table? Explain.

pie chart or bar graph
(could also do Pareto chart)

2. Fill in the following table:

| Type of employment	absolute frequency (# of students)	relative frequency (*fraction in lowest terms*)	relative frequency (in percent)
federal government	25	$\frac{5}{34}$	14.71%
state/local government	48	$\frac{24}{85}$	28.24%
own business	35	$\frac{7}{34}$	20.59%
private company/ business	62	$\frac{31}{85}$	36.47%
Total	170		

3. Explain why the graph shown below is misleading.
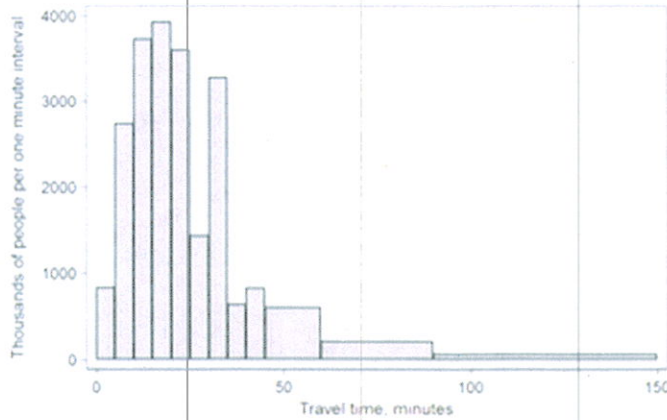
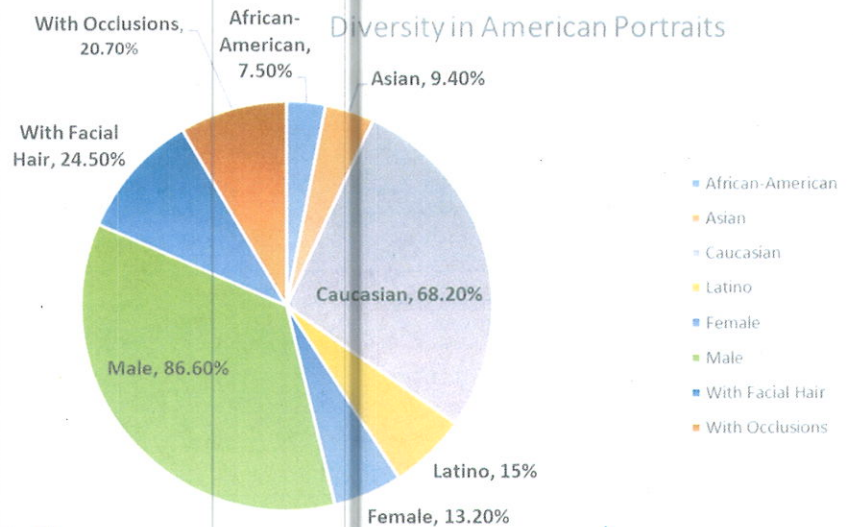*the bars are not equal width our brains perceive larger areas.*

4. Explain why the bar graph below is misleading.

Percent Who Agreed With Court
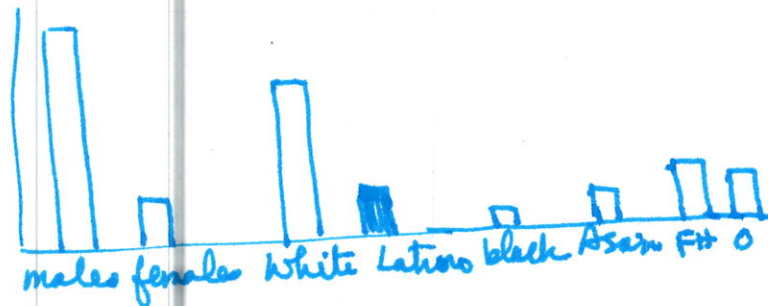

Political Party
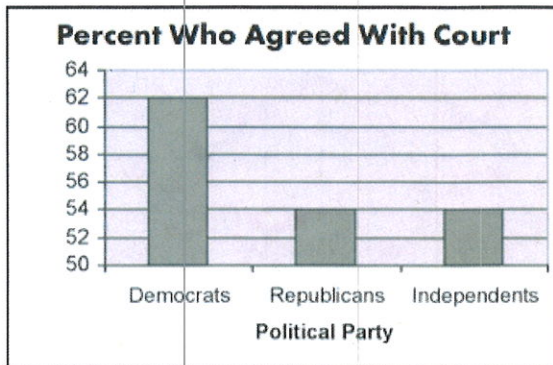
y-axis does not begin at 0 over-emphasizes difference

5. Explain why a pie chart is not an appropriate graph for the data displayed. What would be a better graph type? Sketch such a graph in the space provided.

Diversity in American Portraits

With Occlusions, 20.70%

African-American, 7.50%

Asian, 9.40%

With Facial Hair, 24.50%

Caucasian, 68.20%

Male, 86.60%

- African-American
- Asian
- Caucasian
- Latino
- Female
- Male
- With Facial Hair
- With Occlusions

Latino, 15%

Female, 13.20%

does not add up to 100%

a bar graph would be more appropriate

males females white Latino black Asian FH O

6. Make a stem-leaf plot for the given data:

45, 3, 36, 58, 34, 41, 19, 14, 7, 53, 15, 15, 36, 42, 47, 19, 38, 43, 9, 48

3 7 9 14 15 15 19 19 34 36 36 38 41 42 43 45 47 48 53 58

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0 | 3 7 9
1 | 4 5 5 9 9
2 |
3 | 4 6 6 8
4 | 1 2 3 5 7 8
5 | 3 8
```
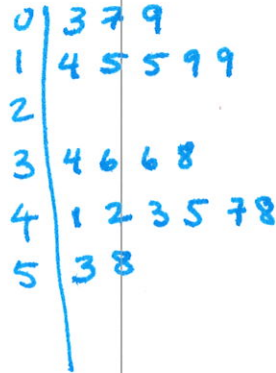
Key: 4|1 = 41

a. In this stem-leaf plot, what is the **modal class** of the data?

40's

7. Given the following weight data in pounds (starting with 120), find the following:

| stem	leaf
12	0 5 7
13	3 3 8 9
14	0 1 6 7
15	2 5
16	8

a. sample mean: 133.1

b. sample median: 138.5

c. sample std. deviation: 28.12

d. sample mode: 133

e. Is the shape of the distribution of the weight data symmetric, skewed left, or skewed right? Circle one.

Slightly right skewed

8. The data for two tests in a math class is shown below.
Maths test scores as percentages

Class 1

70% 44% 42% 78% 48%

44% 70% 34% 81% 51%

68% 86% 66% 71% 77%

Class 2

9% 15% 22% 24% 47%

46% 44% 44% 48% 60%

58% 60% 43% 48% 50%

50% 32% 12%

a. Use the data to construct a comparative stem-and-leaf plot of the data. Be sure to include a key (legend) explaining how to interpret the graph.

Class 1		Class 2
	0	9
	1	2 5
	2	2 4
4	3	2
8 4 4 2	4	3 4 4 6 7 8 8
1	5	0 0 8
8 6	6	0 0
8 7 1 0 0	7	
6 1	8	
	9	

b. What do you notice about the distribution of scores of the two classes? Describe the shape of the distribution for each class: is each symmetric, uniform, skewed right, skewed left or none of these?

Class 1 appears bimodal with a higher mean
Class 2 has a central peak around 40's
both are somewhat left skewed (based on modal class)

c. Find the mean and standard deviation of Class 1.

$\bar{X} = 62$

$S = 16.54$

9. The length of Greek tragedies, in words, is measured and plotted on the graph below. Use the graph to answer the questions that follow.

Length of Greek Tragedies in Words
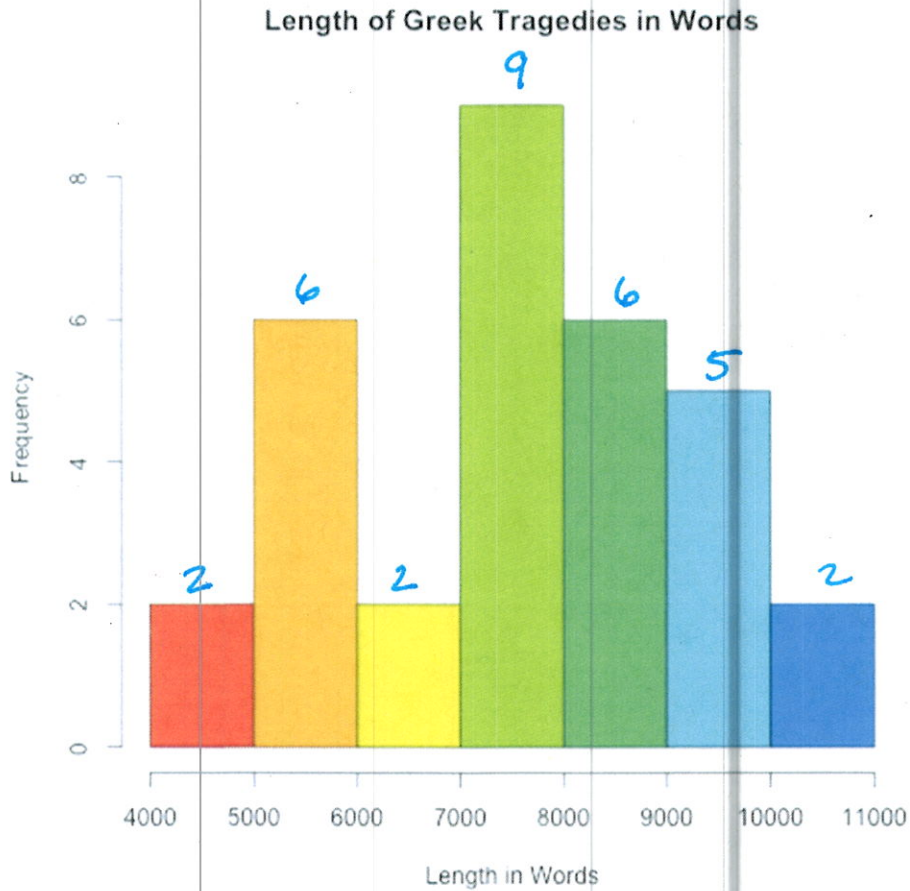
a. How many tragedies were included in this graph?

32

b. Which class is the modal class?

7000 – 8000 words

c. What percent of Greek tragedies are longer than 10,000 words?

$\frac{2}{32} = 6.25\%$

d. In which class does the median tragedy fall?

7000 – 8000 words contains the 16th & 17th items

10. You have calculated the standard deviation for a set of data to be −2.5. You can conclude that
    a. the data is skewed to the left
    b. the data is skewed to the right
    c. there is negative variation in the data
    d. all of the observations in the data set are negative
    e. you have made an error in your calculations

    standard deviations cannot be negative

11. The following table shows the heart rate of students in a conditioning class after 1 minute of doing jumping jacks (beats per minute).

Q_1

68	92	94	96	100	105	106	106	110	110
112	112	115	118	118	120	120	125	125	126

Q_3

Construct a boxplot for the heart rate data. Using the horizontal line below give an appropriate scale and also **show the 5-number summary of the data**.

Med = 116   Min = 68

Q_1 = 102.5 Q_3 = 119   Max = 126
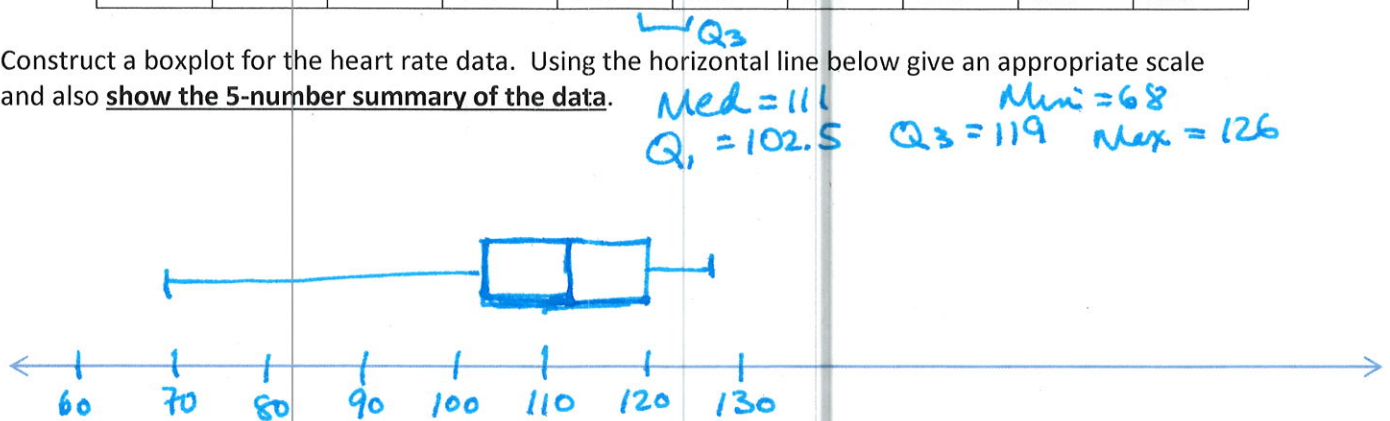
12. Use the data in the table below to answer the questions that follow.

CUSTOMER WAITING TIME IN SECONDS (n=32)							
10.4	12.0	18.7	15.9	11.8	12.0	17.5	11.3
10.9	12.4	11.4	10.7	10.2	13.9	13.0	12.7
12.5	14.3	10.4	16.4	11.4	10.6	13.9	11.2
17.3	11.4	11.2	20.3	19.9	20.0	14.2	11.6

    a. Find the 5-number summary of the data. [Hint: Sort the data first.]

Min = 10.2
Q_1 = 11.25
Med = 12.2
Q_3 = 15.1
Max = 20.3

b. Use the 5-number summary you found to draw a box-and-whisker plot of the data. Draw your graph to scale.
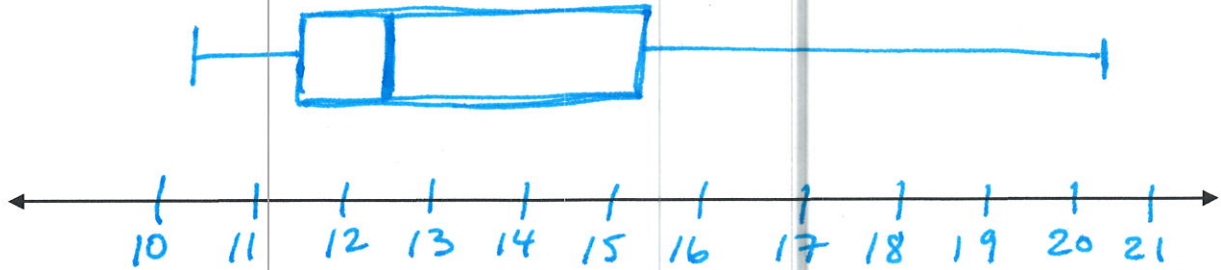
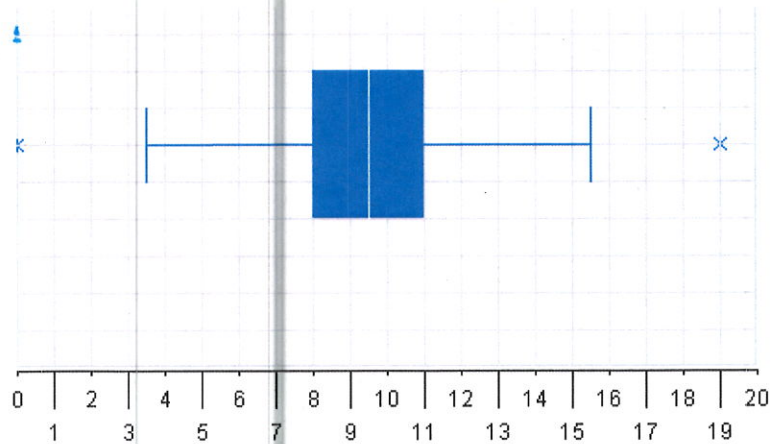13. Using the boxplot to the right, give the following:

a. shape of data distribution:

roughly symmetric

b. median: _____9.5_____

c. interquartile range:

_____3 = 11 - 8_____

14. Which statistic is least resistant to an extremely large value in a data set?

a) mean   (b) median)   c) mode   d) range

15. What is a major advantage of a stem-and-leaf diagram over a histogram?

Stem-and-leaf preserves the data

16. In a random sample, 13 students were asked to count how much cash they were carrying. The results rounded to the nearest dollar are: 20, 45, 10, 80,150, 5, 0, 20, 30, 20, 22,10, 36. Give the following for the sample:
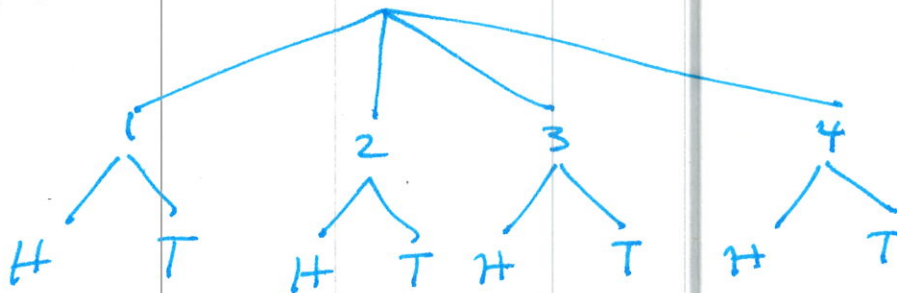
    a. standard deviation: *40.41*

    b. range: *150 − 0 = 150*

    c. Interquartile range:

    40.5 − 10 = 30.5

17. Construct a tree diagram of the outcomes in the sample space for rolling a 4-sided die and flipping a coin.
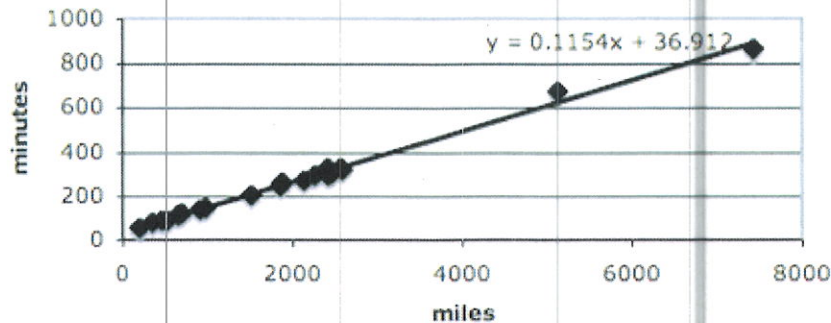

    a. List the sample space.

    { 1H, 1T, 2H,2T, 3H,3T, 4H,4T }

    b. What is the probability of getting an even number and a head?

    $$\frac{2}{8} = 25\%$$

18. Answer the questions that follow based on the scatterplot shown below.

how long the flight takes

a. What is the sign of the correlation of the regression line? Positive, negative or zero?

positive

b. Do you think that the correlation is strong, moderate or weak?

very strong

c. Use the regression line shown on the graph to predict the duration of a flight that is 4000 miles long. How long is that in hours?

$0.1154(4000) + 36.912 =$ *498.5 min*
about 8.3 hrs

d. Use the regression line to predict the duration of a flight that is 11,000 miles long. Do you think you estimate is reasonable? Why or why not?

.1154(11,000) + 36.912 = 1306.3 min   (about 21.8 hrs)
this is not crazy, but it is outside the range of our data

e. Interpret the slope in the context of the problem.

for each additional mile flown, an extra 0.1154 minutes of flight time is needed.

f. Interpret the intercept in the context of the problem.

When one travels 0 miles, you still need about 37 minutes

19. Sometimes our data is too bunched up to make a good stem-and-leaf plot, like the one shown below.

Stem	Leaves
6	4 7 8 9
7	0 2 2 2 2 3 3 3 4 4 4 5 5 6 6 6 7
8	0 0 0 1 1 2 2 2

Key: 6|4=64

Instead, we can split the stems into Low and High stems, as shown below.

Stem	Leaf
6	4
6	7 8 9
7	0 2 2 2 2 2 3 3 3 4 4 4
7	5 5 6 6 6 7
8	0 0 0 1 1 1 2 2 2
8	

This gives us a little more   detail of the distribution.
Use the split-stem stem-   and-leaf plot below to answer the
questions that follow.

Split Stems for Truncated Cereal Sodium Values

0	0
0	57
1	0344
1	568889
2	00112
2	9
3	4

Key: 1|5=15

a. What is the highest amount of sodium found in the breakfast cereals sampled?
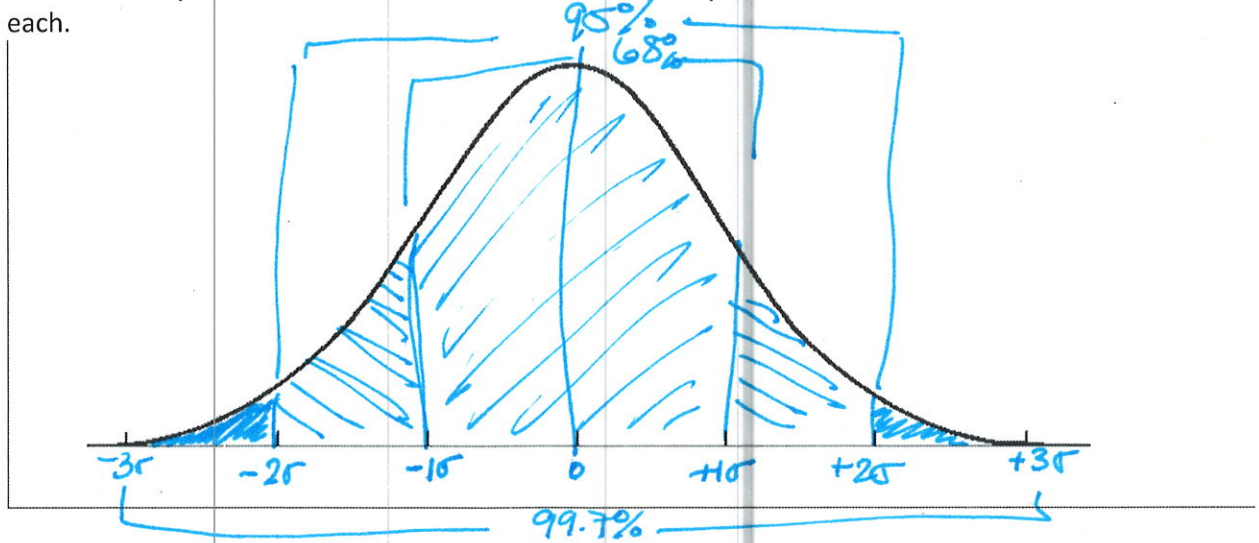
34

b. What is the mode of the distribution?

18

c. Find the median.

18

20. Sketch the Empirical Rule on the blank curve below. Mark your units as one standard deviation each.

95%
68%

-3σ -2σ -1σ 0 $+1\sigma$ $+2\sigma$ $+3\sigma$

99.7%

21. Scores on an IQ test have a mean of 100 and a standard deviation of 15. Sketch the distribution on the blank graph below, and use that to determine the percentage of scores between 70 and 130.

95%

55   70   85   100   115   130   145
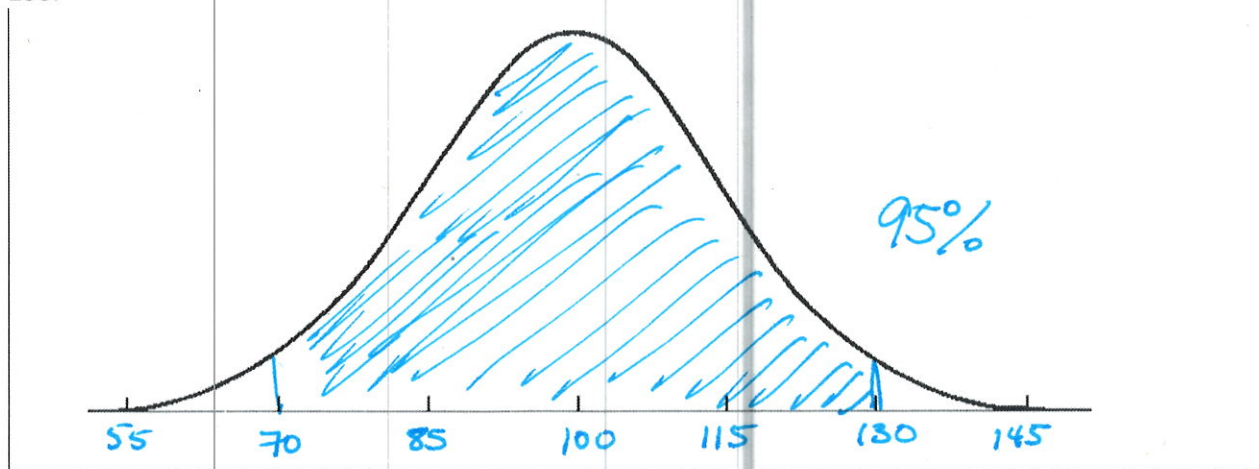
22. The SAT Math test have a mean score of 500 and a standard deviation of 120. Use the Empirical Rules to determine what percent of students scored above 740 on the SAT Math test.

$$\frac{740-500}{120} = 2$$

$$\frac{100-95}{2} = 2.5\%$$

23. The ACT has a mean score of 21.6 and a standard deviation of 5.2. Use the Empirical Rule to determine what percent of students scored below 15 points. (The ACT only scores in integer points, so calculate the percent below 15.4, the nearest standard deviation mark to 15.)

$$\frac{100-68}{2} = 16\%$$

24. To calculate the percentile of a number in a sorted dataset, find N the total number of points in the dataset, and L the location of the number whose percentile you want to calculate (L is the numerical position is in the dataset, not its value, for instance, if you have a dataset like 1 ,4 ,5, 6, 9, 10, 13, then the value of L for the value 4 is 2 since it's the second position in the dataset, and N is 7 since there are 7 numbers). A percentile tells you the percent of the data at or below the given value.

Consider the data below. Round your answers down to the nearest whole percent (unless your value is over 99%).

Ordered October High Temperatures for Asheville, NC

# values = 31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Temp (°F)	52	53	55	56	56	58	58	60	60	61	62	62	63	65	66	67	67	68	68	68	70	71	71	72	72	74	76	77	77	79	81

Air Force Weather

a. Find the percentile of the value 61. $\frac{10}{31} \approx 32^{nd}$ percentile

b. Find the percentile of the value 70. $\frac{21}{31} \approx 67^{th}$ percentile

c. Find the percentile of the value 79. $\frac{80}{31} \approx 96^{th}$ percentile