MTH 150 Test 1
Fall 2017

Elementary Statistics

Name _____

Justify all answers by showing your work or by providing a coherent explanation. Please circle your answers

1. In a certain southwestern city the air pollution index averages 62.5 during the year with a standard deviation of 18.0. Assuming that the data follows a bell-shaped distribution, the index falls within what interval 95% of the time?

a. (8.5, 116.5)
b. (26.5, 98.5)
c. (44.5, 80.5)
d. (45.4, 79.6)
e. There is insufficient information to answer this question.

2. A 1995 poll by the Program for International Policy asked respondents what percentage of the U. S. budget they thought went to foreign aid. The mean response was 18%, and the median was 15%. (The actual amount is less than 1%.) What do these responses indicate about the shape of the distribution of all responses?

a. The distribution is skewed to the left.
b. The distribution is skewed to the right.
c. The distribution is symmetric around 16.5%.
d. The distribution is bell-shaped with a standard deviation of 3%.
e. The distribution is uniform between 15% and 18%.

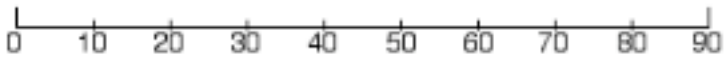
3. When a set of data has suspect outliers, which of the following are preferred measures of center and variability?

a. mean and standard deviation
b. mean and variance
c. mean and range
d. median and range
e. median and interquartile-range

4. The stem plot below is of a data set of size 127. What is the median of this set?

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

5. Sketch a box plot for the data set above.



6. Given the sample data set 1, 2, 2, 5, 6, 6, 8, 10, find the mean and standard deviation (unbiased).

7. Why is the standard deviation preferred over the variance as a measure of variability?

8. How does the mean absolute deviation (MAD) compare to the standard deviation above. Note that the calculation of MAD involves summing the absolute values of the deviations and then dividing by the number of data items. It is a biased estimator, so we must compare it to the biased standard deviation.

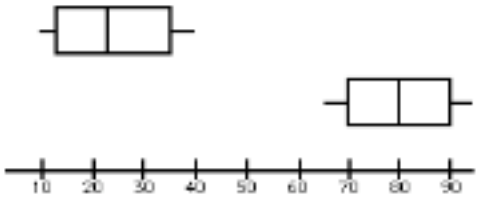
9. Where does the "bias" come from when using these estimators?

10. I can detect a slight skew in the data set from question #6, by comparing the median and mean. Is the skew positive or negative?

11. What is the purpose of *z*-scores and what would be the *z*-score corresponding to 2 in the data set described in question #6?

12. Using the boxplots below, which of the following statements are true?

a. The ranges are the same.
b. The interquartile ranges are the same.
c. Because of symmetry, the medians are the same.
d. all of the above
e. a) and b) above



13. In a group of 10 scores, the largest score is increased by 40 points. What will happen to the mean?

a. It will remain the same.
b. It will increase by 4 points.
c. It will increase by 10 points.
d. It will increase by 40 points.
e. There is not sufficient information to answer this question.

14. In a group of 10 scores, the largest score is increased by 40 points. What will happen to the standard deviation?

a. It will remain the same.
b. It will increase by 4 points.
c. It will increase by 10 points.
d. It will increase by 40 points.
e. There is not sufficient information to answer this question.

15. A data set has 5 elements. The mean of the data set is 48. If we know four of the data elements to be 20, 30, 50, and 70, what must be the fifth data element?

16. A researcher divides the population of product users into three groups based on degree of use. If the researcher then draws a random sample from each user group independently, she has created what type of sample?

a. simple random
b. stratified
c. systematic
d. random digit dialing
e. There is not sufficient information to answer this question.

17. A *statistic* is

a. a sample characteristic
b. a population characteristic
c. a probability
d. normally distributed.
e. There is not sufficient information to answer this question.

18. The distribution of heights of American women aged 18 to 24 is approximately normally distributed with a mean of 65.5 inches and standard deviation of 2.5 inches. Calculate the z-score for a woman six feet tall.

a. 2.6
b. 4.11
c. 1.04
d. I1.33
e. There is not sufficient information to answer this question.

19. Which group below has the larger coefficient of variation?

a. Group A
b. Group B
c. They are the same
d. Meaningless, since they have different sample means
e. There is not sufficient information to answer this question.

	Group A	**Group B**
Sample Size	45	30
Sample Mean	1,000	800
Sample Std. Dev.	80	70

20. Does aspirin reduce heart attacks? A group of over 22,000 doctors were involved in a single blind study study where all doctors were put on a medication regimen, some with aspirin and others with a placebo (no active ingredients). The results are listed in the table below.

	Heat Attacks	**Number of Doctors**
Aspirin	104	11,037
Placebo	189	11,034