Variability: Please use red for your answers

1. Imagine that you had a data set from a sample, and you wished to provide a descriptive measure of variability. Which measure would you use? Standard Deviation

2. What three descriptive methods would you need to fully describe a set of data?

1. Mean   2. Median   3.Mode

3. If a professor returned an exam to you and your exam only had a deviation score of -15, what would you know about your X-score (your exam score)?

If my exam had a deviation score of -15 it means that the location of my exam score is located below the mean. This doesn't necessarily mean that my exam score is a negative number.

4. If a professor returned an exam to you and your exam had a deviation score of 8, and the professor told you that the class mean was 70, you would know that your exam score was:

     Answer: 78

5. Make up 3 sets of data, each of which has 6 scores so that one set has very high variability, one has very low, and one has zero variability:

     High variability   21 ,4 ,90 ,71 ,12 ,44

     Low variability   50, 52, 55, 55, 53, 58

     Zero variability   10, 10, 10, 10, 10, 10

6. You know that the standard deviation for a set of exam scores is 3.5. What does the measure of standard deviation tell you about the entire set of exam scores in relation to the mean?

The standard deviation for the set of exam scores in relation to the mean tells us that majority of the numbers are close to the average value because it's a low standard deviation, and it also tells us that the data is not that much spread out or have a large distance from the mean.

7. What is the statistical notation for the following?

     Population variance: σ^2

     Population standard deviation: σ

     Sample standard deviation: S

     Sum of the squared deviations: SS

8. Calculate SS (by hand, but you do not need to show your work) for the following set of population data:

          Data set: 10, 4, 8, 5, 8

          Answer: <u>24</u>

9. Calculate the population variance (by hand, no need to show work) for the data set in question #8

Answer: <u>4.8</u>

10. Calculate the population standard deviation for the data set in question #8

Answer: <u>2.19</u>

11. A population has a mean of 100 and a variance of 4. What is its standard deviation?

      Answer: <u>2</u>

12. A sample has a standard deviation of 7. What is its variance?

      Answer<u>:</u>   <u>49</u>

13. Calculate SS (by hand, no need to show work) for the following set of sample data: 1, 6, 10, 9, 4

      Answer: <u>54</u>

14. Calculate the sample standard deviation for the data set in question 13.

      Answer: <u>13.5 </u>

15. What is the variance for the sample data in question 13?

      Answer<u>:</u>   <u>182.25</u>

16. If a sample has a standard deviation of 3.2, what is its variance?

      Answer: <u>10,24</u>

17. If a sample has a variance of 2.2, what is its standard deviation

      Answer: <u>1.48</u>

18. A study examines the relationship between hours of sleep and the level of relaxation one feels in the afternoon in a SAMPLE of women. One group was allowed to sleep between 5 and 6 hours and the other group was allowed to sleep between 7 and 8 hours.

Here are the data for both groups:

      5-6 hours of sleep   7-8 hours of sleep

      4, 1, 5, 10, 5, 10   3, 2, 9, 15, 1, 12

Calculate the following by hand:

      Calculate the mean for the 5-6 hour group. Answer   5.83

      Calculate the mean for the 7-8 hour group. Answer: 7

      Calculate the standard deviation for the 5-6 hour group. Answer: 3.54

      Calculate the standard deviation for the 7-8 hour group. Answer: 5.83

      What can you say about the differences/similarities in the descriptive statistics between the groups?
The similarities in the descriptive statistics between the groups is that the mean for the 5-6 hour group and the standard deviation for the 7-8 hour group are exactly the same which is 5.83. Another similarity is that both are positive numbers which means that both sets are above the mean. The difference between the groups is that the group that slept 7-8 hours has a longer range which means they are more relaxed.

  19.   Females   Males

Females	Males
9	8
9	10
10	11
13	12
8	6
9	10
11	14

      Above are SAMPLE data for standardized intelligence scores for men and women.

      What is the mean for women?   9.85

      What is the mean for men?   10.14

      What is the standard deviation for women?   1.67

      What is the standard deviation for men?   2.60

20. The following <mark>POPULATION</mark> data represent memory scores obtained for two groups of women, one older and one younger.

Younger	Older
8	7
6	5
6	8
7	5
8	7
7	8
8	8
8	5

Calculate the sample mean for younger women   <u>7.25</u>

Calculate the sample mean for older women   <u>6.62</u>

Calculate the standard deviation for younger women   <u>0.82</u>

Calculate the standard deviation for older women   <u>1.31</u>

TRUE / FALSE

<u>T</u>   21. The range and the standard deviation are both measures of distance.

<u>T</u>   22. If the highest score in a distribution is $X = 16$ and the lowest is $X = 4$, then the range is 12 or 13 points.

<u>T</u>   23. The range is usually considered to be a relatively crude measure of variability.

<u>F</u>   24. For a population of scores, the sum of the deviation scores is equal to N.

<u>T</u>   25. For a population, a deviation score is computed as $X - \mu$

<u>F</u>   26. A positive deviation always indicates a score that is less than the mean.

<u>F</u>

27. For a population of $N = 4$ scores with $\Sigma X = 1$ and $\Sigma X^2 = 30$, $SS = 5$.

<u>T</u>   28. To calculate the variance for a population, SS is divided by N.

<u>T</u>   29. A population with $SS = 90$ and a variance of 9 has $N = 10$ scores.

F____30. If the population variance is 5, then the population standard deviation is σ = 25.

F____31. If the population variance is 4, then the standard deviation will be σ = 16.

T____32. If the scores in a population range from a low of X = 5 to a high of X -= 14, then the population standard deviation must be less than 10 points.

F____33. A sample of n = 6 scores has SS = 30 and s^2 = 6. If the 6 scores were a population, the value of SS would still be 30, but the variance would be σ^2 = 5.

T____34. A sample with a variance of 25 has a standard deviation equal to 5 points.

T____35. To calculate the variance for a sample, SS is divided by $n - 1$.