

Show all work for full credit! Points in [brackets] total 102.

Part A - Descriptive Statistics [34]

You ask 15 students to compute the average number of hours that they sleep during the next ten nights. From these 15 people you obtain the following results:

4.5 6.5 6.7 6.8 7.0 7.0 7.1 7.4 7.5 7.6 7.9 8.3 8.6 9.0 10.1

1. Construct a stemplot of the data.
[5]

2. Describe the pattern of this distribution and any exceptions to the pattern.
[5]

3. The variance for this data is 1.633. Determine the standard deviation.
[3]

4. Give the 5-number summary for this data.
[5]

BOXPLOT of SLEEP

L = Q_1 = M = Q_3 = H =

5. Use the IQR test to determine if this data contains any outliers.
[5]

6. Construct a *modified* boxplot of this data.
[5]

7. Explain how your answer to #2 is consistent with the shape of your boxplot.
[3]

8. Which is a more appropriate way to describe the center of this distribution --- the mean or the median? **Explain!** (Use the back of the page if needed.)
[3]

Part B - Normal Distributions [26]

The height of women in the U.S. is normally distributed with a mean of 64.5 inches and standard deviation of 2.5.

1. What proportion of women have a height above 63 inches?
[7]

2. What proportion of women have a height between 63 and 66.3 inches?
[7]

3. Determine the 70th percentile for women's heights.
[7]

4. Men's heights are normally distributed with a mean of 69 inches and standard deviation of 2.4 inches. Who would you consider to be "taller", a women who is 66.3 inches or a man who is 70.4? Support your answer with *specific calculations* relating to the normal distributions for these two populations.
[5]

Part C - Sampling Methods [20]

You are interested in how Manchester College alumni feel about the emphasis on inter-collegiate athletics at the College. You decide to stand outside the gate at the homecoming football game and ask the first 100 alumni the question, "In light of recent sports scandals at other colleges and universities, do you feel the College places a proper emphasis on inter-collegiate athletics?"

1. Identify the following groups of people for *this particular survey*.

[12]

- a. the population
- b. the sampling frame
- c. the sample

2. Identify at least two sources of bias (*more for extra credit*) that are present in this sampling method. For each source of bias explain: the type of bias, why the bias is present in this study, and in what direction the bias will occur (i.e., will the bias cause the survey to over- or under-estimate the actual characteristic of the entire population?).

[8]

a.

b.

Part D - Miscellaneous [22]

1. In a normal distribution, a z-score represents the number of _____ that a given data value is from the _____.
[3]
2. The median is called a _____ measure of center since its value is not greatly affected by _____, _____ and _____.
[4]
3. The mean will be less than the median in a skewed _____ distribution.
[2]
4. The “middle 50 percent” of a data set is contained between what two quantities?
[2]
5. When looking at a normal quantile plot we hope the shape of the plot is roughly _____. If this shape is observed we know the data is approximately _____.
[3]
6. State at least three characteristics (*more for extra credit*) of any normal distribution.
[6]
 - a.
 - b.
 - c.
7. The standard deviation is a measure of how much the data varies from the (IQR / median / mean / variance). Circle one of these choices.
[2]