MATH 210 - Test #1 - 2/21/02

_____

Point in brackets total [100]. Show all work for full credit!

Part A - Descriptive Statistics [25 points, 5 each]

Consider the following set of data: 25   42   58   63   66   74   77   78   85   86

1.   Construct a *stemplot* of this data.

2.   Give the *5-number summary* for these data.

3.   Using the *IQR test*, determine if any of the data values should be considered outliers.

4.   Construct a *modified boxplot* for these data.

5.   For these data, which value would you expect to be greater — the mean or the median?
        Base your answer on your *stemplot* and *give two reasons* to support your conclusion.

Part B - Normal Distributions [28 points, 7 each]

Suppose the mean number of hours Manchester students study per week is 20, with a standard deviation of 4.

1.   Give a range containing the weekly study time for "almost all" (that is almost 100%) of the student body.

2.   What percent of M.C. students study *more than* 27 hours per week?

3.   What percent study *between* 15 and 25 hours per week?

4.   How many hours must you study per week in order to be in the top 10% of Manchester "studiers?"

Part C - Sampling [24 points]

You wish to estimate the mean amount of time that Manchester students spend studying in the library each week. On the Saturday afternoon before finals you stand outside and ask the first 50 M.C. students that walk in the library, "How many hours did you spend in the library this past week."

1.   For this survey identify:
[12]
      a.   the population

      b.   the sampling frame

      c.   the sample

2.   Identify *three* reasons why this sampling method is biased. Be sure to indicate the *type* of bias (from the five types discussed in class) and the *direction* of the bias. (I.e., will the bias cause the mean computed from your sample to be too high or too low?) **Explain your answers fully!**
[12]
      a.

      b.

      c.

Part D - Miscellaneous [23 points]

1. In the following list, circle the numerical measures that have the same units as the original data:

[5]   mean   median   IQR   standard deviation   variance

2. The median is said to be a "resistant measure of center," while the mean is not. Explain the meaning of this statement, including the three things that the median is resistant to.

[5]

3. Compute the *variance* and *standard deviation* for the following set of numbers: 3   8   10

[5]

3. A class's test scores are observed to be normally distributed. Thus the instructor computes the *standardized value* for each student's test score. Joe's z-score is –4.50. What should he conclude about his test score compared to the rest of class? **Explain your answer!**

[5]

4. A set of numerical data is approximately normal if the corresponding quantile plot is

   _____.

[3]

Extra Credit [+3]

You construct a histogram for a set of numerical data. If you observe the following in the histogram explain (or draw) what you will see when you make a normal quantile plot of the data.

a.   The histogram is very symmetric but is not normal.

b.   The histogram is extremely skewed.