Math 220 : Elementary Statistics — Kane Nashimoto
Exam 1 - Ch. 1, 2, 3, 4
Summer 2006 — Name : _____

Directions: This exam contains six problems worth a total of 100 points. For each computational problem, you must first write the formula to be used and present all your subsequent work in order to receive full or partial credit. Circle your final answers.

1. The data from a simple reaction-time experiment show a sample mean of $\bar{x} = 521$ milliseconds and a standard deviation of $s = 87$. The distribution of the data is unimodal and positively skewed.

   (a) Must the median reaction time be longer or shorter than 521 milliseconds? Justify your answer. (8 pts.)

   (b) One participant in the experiment had a reaction time of 401 milliseconds. Compute the z-score for this participant's reaction time. (8 pts.)

2. The following are ages of 12 graduating seniors.

   X : {22, 23, 24, 22, 22, 28, 20, 23, 21, 21, 24, 22}

   (a) Using the space on the right, construct a stem-and-leaf display for the data. (10 pts.)

   (b) Comment on the skewness of the distribution of the data. (8 pts.)

3. Consider the following data on weight (in pounds) for five adult men.

   $$X : \{174, 202, 186, 159, 193\}$$

   (a) Compute the sample median. (8 pts.)

   (b) Compute the sample mean and sample variance. (10 pts.)

4. In a study to investigate the effect of diet control on the level of cholesterol, 90 college students were randomly divided into three groups. The students in the first group were instructed to continue their normal diet, those in the second group were instructed to cut down their fat intake by 50%, and those in the third group were instructed to consume a minimal amount of fat. Cholesterol levels were measured two months after the onset of the study, by which time, 40% of the participants in the third group had withdrawn from the study. The results of the study were such that the first and the second group of participants had similar cholesterol levels but the third group of participants had significantly lower cholesterol levels.

   (a) Is there a potential bias in this study? If so, what is it? (8 pts.)

   (b) The researcher concluded, "Healthy diet reduces the cholesterol levels for adults." Aside from the potential bias in (a), what is the problem with this conclusion? (8 pts.)

5. For each of the following, determine whether the data are categorical or numerical. If the data are numerical, further determine whether they are discrete or continuous. (4 pts. ea.)

   (a) Noon temperatures (in Celsius) for 12 cities. ..... _____

   (b) Species of seven trees. ..... _____

   (c) Annual revenues (in dollars) for 45 companies. ..... _____

   (d) Shoe sizes (in UK measure) for five adults. ..... _____

6. Consider the two data sets $X: \{20, 20, 10, 20, 20\}$ and $Y: \{20, 20, 30, 20, 20\}$.

   (a) Which data set has the larger standard deviation, X or Y, or do they have the same standard deviation? No computation is necessary to answer this question. (8 pts.)

   (b) For $Z: \{20, 20, c, 20, 20\}$, assign a value to c so that the standard deviation of Z will be smaller than that of X or Y. Note: Solution is not unique. (8 pts.)