Math 220 : Elementary Statistics Kane Nashimoto
Exam 1 - Ch. 1, 2, 4
Summer 2009 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. A polling organization conducted a survey to estimate the percentage of the people who support the proposal of imposing a special tax on imported vehicles in order to save the domestic automakers. The organization selected a random sample of 1000 people from the list of registered voters in Virginia. Among the people selected, 658 responded to the question, of whom 24.9% favored the proposal.

   (a) Based on the description of the scenario, what type of bias is likely to be present in the results of the study? Note: There may be multiple biases, but one is clearly most obvious. (6 pts.)

   (b) What sampling frame was used in this survey study? (6 pts.)

   (c) Compute the margin of error for the percentage of the people who support the proposal. (6 pts.)

   (d) Based on your answer in (c), can you conclude that more than 20% of the people support the proposal? Justify your answer. (6 pts.)

   (e) In order for the margin of error for the percentage of interest to be 2.5%, how many people must be surveyed? (6 pts.)

2. For each of the following variables, determine whether the variable is categorical or quantitative. For quantitative variables, further determine whether they are discrete or continuous. (4 pts. ea.)

   (a) Number of midterm exams given in a course ..... _____

   (b) Color of a wall in a bedroom ..... _____

   (c) Time required (in sec) for a computer to boot up .. _____

   (d) Difficulty level of an exam (easy, okay, tough) ..... _____

3. The instructor of a physics course conducted a short survey with his students. One of the questions was, "On average, how many hours do you study at home for this course each day? Round to the nearest whole number." Of the sample of $n = 7$ responses, one was 0, three was 1, two was 2, and one was 5.

   (a) Compute the sample mean and the sample standard deviation for the number of hours of studying. Show your work. (12 pts.)

   (b) Using the mean and standard deviation in (a), compute the z-score for the student who indicated studying 5 hours. Interpret the computed value. (8 pts.)

4. Briefly, but clearly, describe an example of an experimental study (with context), which produces a placebo effect. (6 pts.)

5. Consider the following data on shoe size (in US measure) for a sample of 12 adult men.

$$X: \{9,\ 7.5,\ 10,\ 8,\ 13,\ 9,\ 9.5,\ 8,\ 9.5,\ 7.5,\ 11.5,\ 8.5\}$$

   (a) Construct a stem-and-leaf plot for the data using a stem width of 1 and not repeating the stem digits. (8 pts.)

   (b) Give a five-number summary for the data. (8 pts.)

6. Consider the following hypothetical data.

$$U: \{1,\ 2,\ 3,\ 4,\ 5\}$$

   The sample mean of U is 3.00 and its standard deviation is 1.58. To answer the following questions, no computation is required.

   (a) Consider $V = U + 5$ (i. e., 5 is added to each of the original data value). What are the mean and standard deviation of V? (6 pts.)

   (b) Consider $W = 3\,U$ (i. e., each of the original data value is multiplied by 3). Will the standard deviation of W be larger or smaller than 1.58? Briefly explain why. (6 pts.)