Examples for Chapter 1– Introduction to Statistics
Math 1040-1

Section 1.1

1. For each of the following scenarios, identify the (implied) population, the sample, and any parameters and statistics:

   (a) In California in October 2003, a special election was held to determine whether Governor Gray Davis should be recalled from office. The exit poll on which TV networks relied for their projections found after sampling 3160 voters that 54% of the sample voted to recall Gray Davis and 46% voted not to recall him.

   (b) *USA Today* reported that 44.9% of those surveyed (1261 adults) ate in fast-food restaurants from one to three times each week.

   (c) According to *Consumer Reports*, a random sample of 35 new cars gave an average of 21.1 miles per gallon.

   (d) 4 out of 524 total passengers and crew survived the crash of Japan Airlines Flight 123 in August of 1985.

2. For each of the following scenarios, identify the description and the inference:

(a) The Current Population Survey (CPS) is a monthly survey of households conducted by the U.S. Census Bureau for the Bureau of Labor Statistics. It provides a comprehensive body of data on the labor force, employment, and unemployment. A CPS of about 60,000 households indicated that of those households, 8.0% of the whites, 23.4% of the blacks, and 22.7% of the Hispanics had annual income below the poverty level. Using these data, a statistical method makes the prediction that the percentage of all black households in the United States that had income below the poverty level was at least 22% but no greater than 25%.

(b) During the past 2 years, every time that Julia ran 2 miles, she recorded her run time. Her average time for these 90 runs was 15.6 minutes. Using a statistical method, she concludes that her exact average time for running 2 miles is between 15.23 and 15.97 minutes.

Section 1.2

1. Identify each of the following as qualitative or quantitative:

   (a) Gender

   (b) High school GPA.

   (c) The letter grade that you will receive for this course.

   (d) Annual salary

2. Identify each of the following as being at the nominal, ordinal, interval, or ratio level of measurement:

   (a) The years in which the LA Lakers won the NBA championship (for example, 2010)

   (b) A restaurant's food and service rating (from 1–5 stars, with 1 being the lowest)

   (c) A restaurant's food and service rating ("Horrible," "Poor", "Average," "Good," "Great")

   (d) A collection of zip codes

   (e) Total touchdowns thrown by each quarterback in the NFL for the 2011 season

   (f) Annual salary

   (g) Today's temperature in degrees Fahrenheit

   (h) Motion Picture Ratings (G, PG, PG-13, etc.)

Section 1.3

1. Identify which method for collecting data (observational study, an experiment, a simulation, or a survey) is best in each of the following situations and explain your answer.

   (a) The effect a severe earthquake would have on the Salt Lake Valley.

   (b) Whether or not a certain coupon attached to the outside of a catalog makes recipients more likely to order products from a mail-order company.

   (c) Whether or not smoking has an effect on coronary heart disease.

   (d) Determining the average household income of homes in Salt Lake City.

2. For the following experiment, determine the experimental units, treatments, and sample size. Indicate whether this experiment is blind, double-blind, and/or randomized. Also identify any potential problems with the design.

   A study with 233 low-income adult smokers evaluated the effectiveness of usual care (physician advice and follow-up) for smokers wishing to quit to the usual care enhanced by computer-assisted telephone counseling sessions. Each subject was assigned randomly either to the usual care or to the usual care plus counseling, and their smoking status (still smoking or quit smoking) was observed after 3 months. The percentage who had quit smoking was higher for the group receiving counseling. (from *Journal of Family Practice* 2000;50:138-144)

3. How would you design a placebo-controlled double-blind experiment with a randomized block design for the following situation: A veterinarian wants to test a strain of antibiotic on calves to determine their resistance to a common infection, and if their gender plays a role. In a pasture, there are 22 newborn calves (11 males and 11 females). There is enough vaccine for 10 calves, but blood tests to determine their resistance to infection can be done on all calves.

4. Determine which kind of sampling was used in each of the following scenarios:

   (a) To determine the quality of on-campus housing, 20 residents from each dorm were chosen to complete a survey.

   (b) To evaluate employee compensation, choose a random sample of 10 zip codes in the state, then survey all businesses within each chosen zip code about their benefits package.

   (c) Those who participate to a survey linked to from cnn.com.

   (d) To determine the quality of education at the University of Utah, a UNID number is chosen at random, then every 1000th student is evaluated until 30 students are selected.

   (e) Interested in only one neighborhood, you walk door-to-door to ask residents questions. Since your time is limited, you do not have a chance to revisit houses where no one answered the door.

   (f) Interested in only one neighborhood, you walk door-to-door to ask residents questions. Everyone was home and willing to participate, so you have survey results from every household in the neighborhood.

   (g) Chosen at random, 300 people who received care at the University Hospital participated in a survey.

5. Using Table 1, determine which 5 students from this class (numbered 1-26) should be selected to participate in a survey.