Statistics 101 – Homework 6

Due Wednesday, October 14, 2009
Homework is due on the due date at the end of the lecture.

Reading: October 5 Chapter 11
October 7 – October 12 Chapters 12 & 13

Assignment:

1. Do the following problems from the text, *Intro Stats*, 3rd Edition. If you have an earlier edition of the text, check with someone who has the 3rd Edition to make sure you do the correct problems.

    a) Chapter 11 – problems 7, 8, 15, and 21.
    b) Chapter 12 – problems 3, 4, 7, 10, and 23.
    c) Chapter 13 – problems 1, 2, 7, 9, 10, and 12.

2. CBS News/New Your Times conducted a public opinion survey between September 19th and 23rd, 2009. 1,042 randomly selected adults from across the United States were contacted and asked the question, "Do you approve or disapprove of the way Barack Obama is handling health care?" 47% of the people contacted said they approve, 45% said they disapprove, and 8% were unsure.

    a) Identify the population.
    b) Identify the population parameter of interest.
    c) Identify the sample.
    d) Are the percentages given in the description sample statistics or population parameters? Explain briefly.
    e) Identify the sampling method, including whether or not randomization was employed.
    f) Identify any potential sources of bias you can detect and any problems you see in generalizing to the population of interest.

3. Below is a list of 10 individuals, name and gender. We wish to select 3 individuals at random from the list of 10.

0 Kaeli (F)	1 Ryan (M)	2 Lindsey (F)	3 Jon (M)	4 Matt (M)
5 Kristi (F)	6 Dawn (F)	7 Alisha (F)	8 Juan (M)	9 Amy (F)

    a) Explain how you would use the table of random numbers in the back of your text (row 22 starting from the left) to select a simple random sample of three individuals. Who are the three individuals selected?
    b) Describe how you would randomly sample to ensure that there would be one male (M) and two females (F) chosen. Again use the table of random numbers in the back of your text (row 22 starting from the left) to select your sample of one male (M) and two females (F).

4. The following is excerpted from a Des Moines Register article that appeared Sunday, September 27, 2009.

Study finds antennas are key to monarch butterfly navigation.

Millions of monarch butterflies migrate to Mexico for the winter; and scientists have long speculated on how the insects find their way. It turns out that their antennas are the key. How do we know? Researchers painted butterfly antennas black, and the insects got lost. The researchers … did the test by holding the butterflies' wings gently and dipping their antennas in enamel paint. The ones with black paint were unable to orient to the south … while butterflies whose antennas were coated with clear paint had no trouble navigating. Because the animals with black paint got lost even though their eyes were able to see light, the researchers concluded the antennas were vital for navigation.

a) Why is this study an experiment and not an observational study?
b) What is the response variable? Is this variable categorical or numerical?
c) What are the treatments?
d) Is there a control group? Explain briefly.
e) Suppose there were 100 butterflies in the experiment, explain briefly how butterflies should have been assigned to treatments. Your explanation should be complete enough so that a person not knowledgeable in statistics could follow your explanation and actually assign the butterflies to the treatments.

5. The following is excerpted from an article in the Des Moines Register on May 16, 2009.

Mixing energy drinks, alcohol can be dangerous, study shows.

Along with a jolt of caffeine, the beverages, such as Red Bull, Rockstar, Monster and Amp, have the potential for negative health effects if mixed with alcohol, according to the research.

A survey of 4,200 North Carolina college students showed that the 25 percent of students who drank alcohol and energy drinks combined consumed more alcohol than their peers who didn't mix booze and energy drinks.

Students who drank energy drinks with alcohol were twice as likely to be injured or to take advantage of someone sexually and almost twice as likely to ride with a drunken driver, the survey showed.

a) Why is this study an observational study and not an experiment? Explain briefly.
b) Is this a prospective or a retrospective study? Explain briefly.
c) What is the explanatory variable? Is it categorical or numerical?
d) What is one response variable?
e) How should the college students have been selected so that the results of the survey can be generalized to all college students in North Carolina?