Statistics 101 – Homework 6

Due Wednesday, March 4, 2009
Homework is due on the due date at the beginning of the lab.

Reading: February 23 – February 27 Chapters 12 & 13

Assignment:

1. ABC News/Washington Post Poll conducted a public opinion survey between February 19th and February 22nd, 2009. 1,001 randomly selected adults from across the United States were contacted and asked the question, "Do you approve or disapprove of the way Obama is handling the economy?" 60% of the people contacted answered Approve, 34% answered Disapprove, and 6% answered Unsure.
   a) Identify the population, be specific.
   b) Identify a population parameter of interest.
   c) Identify the sample, be specific.
   d) Identify the sampling method, including whether or not randomization was employed.
2. 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 21 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, regardless of where you started in the table of random numbers.
3. The following excerpt is taken from an article that appeared in the Des Moines Register on Sunday, February 26, 2006.

   Stress can lead to miscarriage.

   Pregnant women who are stressed out during the first three weeks after conception are nearly three times as likely to miscarry, a new study finds. The researchers evaluated 61 women over 12 months, collecting each woman's urine three times a week to check for pregnancy status and levels of cortisol, a stress-linked hormone. Of the 61 women, 22 got pregnant. Nine carried to term and 13 miscarried. Women with increased cortisol levels during the first three weeks of pregnancy were 2.7 times more likely to miscarry, the researchers found. Miscarriages occurred in 90 percent of pregnancies in which the women had increased cortisol levels and in 33 percent of those with normal cortisol levels.
   a) Why is the study an observational study and not an experiment?
   b) Is it a retrospective or prospective study? Explain briefly.
   c) Who were the subjects studied?
   d) What are the variables of interest? Indicate what type of variable each is.
   e) What is a parameter of interest?

4. The following excerpt is taken from an article that appeared in the Des Moines Register on Sunday, January 25, 2009.

New pill from Merck may help MS victims.

German drug maker Merck Serono is one step closer to releasing the first pill to treat multiple sclerosis, the company said Friday.

In a news statement, Merck said patients taking cladribine tablets had a nearly 60 percent lower relapse rate than those on placebo pills. The two-year study included 1,326 MS patients randomly divided into three groups. Two groups received different doses of cladribine and one group received fake pills.

Patients on cladribine had up to a 60 percent reduced chance of having a relapse compared to patients on placebo. The study was paid for by Merck.

a) Why is the study an experiment?
b) Identify the subjects studied.
c) Identify the factor(s) in the experiment.
d) Identify the treatments.
e) Identify the response variable measured.
f) Explain how you know that the study was conducted using a completely randomized design and make a diagram of the study. Assume that an equal number of subjects are in each group.
g) What does this experiment tell us about the relationship between dosage level of cladribine and relapse rate of MS.

5. The following is taken from an article in the Des Moines Register, January 14, 2007, page 4AA entitled "Study: Milk blunts heart benefits of tea."

"There are a lot of studies that show that tea is protective against cardiac diseases," said lead researcher Dr. Verena Stangl, professor of cardiology at the Charite Hospital, Universitatsmedizin-Berlin, in Germany. "If you look at the studies, you see that in Asia there are less cardiac diseases, but in England that's not the case. So the question is, is the addition of milk a reason for this difference between Asia and England, where tea is often taken with milk?" she said.

In the study, 16 healthy postmenopausal women drank either half a liter of freshly brewed black tea, black tea with 10 percent skimmed milk, or boiled water on three different occasions. The researchers then measured the function of the cells lining the brachial artery in the forearm before and two hours after beverage consumption. Stangl's team found that black tea significantly improved the ability of the arteries to relax and expand. "But when we added milk, we found the biological effect of teas was completely abolished," she said.

a) Why is the study an experiment?
b) What is the response variable?
c) What is the explanatory variable?
d) What treatments are compared?
e) Is there a placebo? Explain briefly.
f) Is this a "blind" study, e.g. are participants not aware of which treatment group they are in? Explain briefly.
g) Based on a combination of the information in the article and your knowledge of sound study design, make a diagram that shows how you think the study was designed. Hint: Each woman experienced all three treatments.