Review for Unit 1 Test

1) Lambert and Pinheiro (2006) describe a study in which researchers try to identify characteristics of cell phone calls that suggest the phone is being used fraudulently. For each cell phone call, the researchers recorded information on its **direction (incoming or outgoing), location (local or roaming), length of call, time of day, day of week, and whether the call took place on a weekday or weekend.**

(a) What are the observational units in this study?

(b) List the categorical variables and tell whether they are binary or not.

(c) Identify the quantitative variables.

(d) Is " *Number of calls from your family in a day"* a legitimate variable in this study? Explain why or why not.

2) In August 2005, researchers for the American Society for Microbiology and the Soap and Detergent Association monitored the behavior of more than 6300 users of public restrooms. They observed people in public venues such as Turner Field in Atlanta and Grand Central Station in New York City. They found that 2393 of 3206 men washed their hands compared to 2802 of 3130 women.

(a) Calculate the proportion of men who washed their hands.

(b) Calculate the proportion of women who washed their hands.

1. Do male doctors perform more cesarean sections (C-sections) than female doctors? A study in Switzerland examined the number of cesarean sections (surgical deliveries of babies) performed in a year by samples of male and female doctors. The data are organized below:

Number of cesarean sections per year for **male doctors**							
20	25	25	27	28	31	33	34
36	37	44	50	59	85	86	
Number of cesarean sections per year for **female doctors**							
5	7	10	14	18	19	25	29
31	33						

a) Identify the explanatory and response variables. Classify each as categorical or quantitative.

Explanatory:

Response:

b) Identify the population of interest.

c) Identify the sample.

d) Is this an observational study or an experiment? Explain.

2. Here are the salaries for each member of the Boston Red Sox Baseball team on opening day of the 2005 season.

Rank	Name	Salary	Rank	Name	Salaries
1	Ramirez, M	$ 22,000,000	15	Bellhorn, M	$ 2,750,000
2	Schilling, C	$ 14,500,000	16	Timlin, M	$ 2,750,000
3	Damon, J	$ 8,250,000	17	Mueller, B	$ 2,500,000
4	Renteria, E	$ 8,000,000	18	Arroyo, B	$ 1,850,000
5	Varitek, J	$ 8,000,000	19	Miller, W	$ 1,500,000
6	Foulke, K	$ 7,500,000	20	Mirabelli, D	$ 1,500,000
7	Nixon, T	$ 7,500,000	21	Halama, J	$ 850,000
8	Clement, M	$ 6,500,000	22	Mantei, M	$ 750,000
9	Ortiz, D	$ 5,250,000	23	Vazquez, R	$ 700,000
10	Wakefield, T	$ 4,670,000	24	Myers, M	$ 600,000
11	Wells, D	$ 4,075,000	*25*	*McCarty, D*	*$ 550,000*
12	Millar, K	$ 3,500,000	26	Youkilis, K	$ 323,125
13	Payton, J	$ 3,500,000	27	Neal, B	$ 321,000
14	Embree, A	$ 3,000,000	28	Stern, A	$ 316,000

(a) Who/what is the population? Who/what is the sample?

(b) Classify the variable *salary* as categorical or quantitative.

(c) Classify the variable *salary above $1,000,000* as categorical or quantitative.

(d) Calculate the proportion of players with salaries above $1,000,000. Calculate the proportion of players with salaries below $1,000,000.

(e) Are the numbers you calculated in part (d) statistics or parameters? Explain.

3) In the "Golf Plus" section of its August 21, 2006, issue, *Sports Illustrated* presented the results of its Junior Golfer Survey. Participants in the survey were the 72 golfers, 36 boys and 36 girls aged 13-18, who had played in a recent American Junior Golf Association Tournament.

(a) Would you consider this to be a representative sample from the population of all American teenagers? Explain.

(b) One of the questions asked was, "If you could vote for President, would you be more likely to vote for a Democrat or Republican?" Would you expect this sampling procedure to be biased with regard to this variable? If so, do you think the bias will overestimate support for Democrats or Republicans? Explain.

(c) Two other questions asked of these golfers were:

- How many hours are you online during a typical week?
- Do you have your own cell phone?

Would you expect this sampling procedure to be biased with regard to these variables? If so, indicate the direction of the bias, and the confounding variables that led to the bias.

12. The October 6, 1993 issue of *The New York Times* reported on a study in which convicts were given a course in great works of literature. To be accepted for the program, the convicts had to be literate and to convince a judge of their intention to reform. After 30 months of parole, only 6 of these 32 had committed another crime. This group's performance was compared against a similar group of 40 parolees who were not given the literature course; 18 of these 40 had committed a new crime after 30 months.

(a) Identify the explanatory and response variables. Classify each as categorical or quantitative.

Explanatory:

Response:

(b) Identify the population of interest.

(c) Identify the sample.

(d) Is this an observational study or an experiment? Explain.

(e) Calculate the proportion of convicts in the *literature group* that committed a crime within 30 months of release. Calculate the proportion of this group that <u>did not</u> commit a crime.

Committed Crime:

Did not commit crime:

(f) Calculate the proportion of convicts in the *control group* that committed a crime within 30 months of release. Calculate the proportion of this group that did not commit a crime.

Committed Crime:

Did not commit crime:

(g) Are the numbers you calculated in parts (e) and (f) above statistics or parameters? Explain your answer.

12. Suppose you want to determine how much time high school students spend on the computer and/or internet. You decide to use the computer club from your school as a sample to research your question. You interview each student in the club and record the average number of hours per day they spend on the computer and/or internet.

(a) What type of sampling method have you used?

(b) Would you expect this sampling method to be biased with regard to this variable? If so, indicate the direction of the bias (high or low), and explain your answers.