Math 135 -- Test 2
March 7, 2011   Name _____

Take your time and make sure you follow all instructions. Where necessary, work must be shown in order to receive partial credit.

1. A city hires a consulting firm to contact 500 out of the 250,000 adult residents to gather public opinion on the city building a new arena. The firm finds that 45% support the plan for the new arena. Later that month an election is held and the plan to build the arena passes with 53%.   [2 pts each]

    A. Parameter   B. Population   C. Sample   D. Statistic

_____   a.   The 53% is an example of a what.

_____   b.   The 45% is an example of a what.

_____   c.   The 500 residents is an example of a what.

_____   d.   The 250,000 residents is an example of what.

2. The consulting firm in the previous problem will use one of the following methods to further assess public opinion on the project. Which method is illustrated in each example?   [2 pts each]

    A. Census   B. Simple Random Sample (SRS)   C. Stratified Random Sample
    D. Cluster Sample   E. Multistage Sample   F. Systematic Sample
    G. Voluntary Response Sample   H. Convenience Sample

_____   a.   Randomly select 250 female and 250 male adult residents to contact.
                       .

_____   b.   Contact every 50th person from a list of adult residents.

_____   c.   Randomly select 400 adult residents contact.

_____   d.   Randomly select two voting precincts and contact every adult resident in the selected precincts.

_____   e.   Contact every adult resident in the city.

_____   f.   Randomly select four voting precincts. Within the selected voting precincts randomly select 100 adult residents to contact.

_____   g.   Place an ad in the city newspaper asking residents to visit the city's website to participate in an online poll.

_____   h.   Contact 400 adult residents at the mall and have them fill out a survey.

3. Match each of the following.   [2 pts each]

    A. Anecdote   B. Experiment   C. Prospective Study   D. Retrospective Study

    _____ a.   A scientist notices a bird fed a special feed with vitamin B12 flies faster.

    _____ b.   A researcher randomly assigns 100 hogs into a group that will be given a new feed
                     designed to keep the hogs healthy over the winter months.

    _____ c.   A researcher studies the habits of 100 facebook users for the next two weeks.

    _____ d.   A researcher identifies 200 smokers and looks at their medical records over the past 5
                     years.

4. What problem is illustrated with each example?   [2 pts each]

    E. Common Response   F. Confounding   G. Nonresponse
   H. Placebo Effect   I. Response Bias   J. Undercoverage
    K. Blinding

    _____ a.   5% of the control group in a trial of a new sleeping medicine said they had improved
                     sleep.

    _____ b.   A researcher claims that colder temperatures cause more car accidents since accidents
                     increase in a city during the winter.

    _____ c.   Out of all residents sent a survey on the performance of the city's mayor only 20% of
                     residents fill out and return the survey.

    _____ d.   As residents of a city are entering Wal-mart they are asked to fill out a survey on the
                     condition of the city park.

    _____ e.   A question with many technical terms will lead to what problem.

    _____ f.   Patients in the trial of a new cholesterol medicine do not know if they are in a group
                     receiving the new drug or not.

    _____ g.   A university notices that retention of students went up over the last 5 years since the
                     expansion of campus tutoring and implementation of mentoring program.

5. The weight of a vehicle (in pounds) and the gas mileage (in miles per gallon) are linear associated. Computer gives the regression line, $\widehat{mileage} = 59 - 0.01\,weight$ and $R^2 = 0.90$. Use the information to answer the following questions.   [4 pts each]

_____   a.   Which is the best interpretation of the y-intercept.
    A) The mileage is 0.01 mpg when the weight is 0 pounds.
    B) The mileage is 0.01 mpg when the weight is 5000 pounds
    C) The mileage is 59 mpg when the weight is 0 pounds.
    D) The mileage is 59 mpg when the weight is 5000 pounds.

_____   b.   Which is the best interpretation of the slope of the regression line.
    A) For every decrease in 1 pound in weight the mileage decreases 0.01 mpg.
    B) For every decrease in 1 pound in weight the mileage increases 0.01 mpg.
    C) For every increase in 1 pound in weight the mileage decreases 0.01 mpg.
    D) For every increase in 1 pound in weight the mileage increases 0.01 mpg.

_____   c.   Which is the best interpretation of the value of R^2.
    A) The line describes 10% of the variation between the vehicle's mileage and weight.
    B) The line describes 90% of the variation between the vehicle's mileage and weight.
    C) The vehicle's weight describes 10% of the variation between the line and mileage.
    D) The vehicle's weight describes 90% of the variation between the line and mileage.

        d.   What is the correlation for the linear association.

6. Use the scatterplots below to answer the following questions.   [3 pts each]

_____   a.   Which has a strong nonlinear association?

_____   b.   Which has a negative association that is not strong?

_____   c.   Which has a stray point that is influential

_____   d.   Which has a stray point that has low leverage but a large residual.
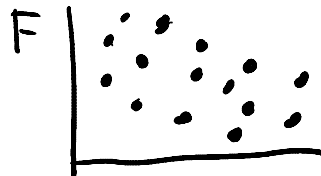
7. The following table lists the number of years since elk were released in an area and their population

[31 points]

a) Sketch a scatterplot (Label your axis!)

Years Released (x)	Elk Pop. (y)
2	20
4	35
5	42
6	52
7	58
9	69
10	78
12	102
14	145

b) Determine the correlation using your calculator.

c) Determine the equation of the least squares regression line ($\hat{y} = a + bx$).

d) Use the linear model to estimate the elk population 30 years after release. Why or why not would this be a reliable predictor?