**Worksheet 1**  
**Random Sampling**

This worksheet continues from Discussion Sheet 1. You should do it first.

1. You decide to be extra careful about determining the typical gas mileage for the car in Question 3 in Discussion Sheet 1. You do the driving experiment with 10 gallons of gas 20 times and record how many miles are driven each time. You calculate the miles per gallon on each of the 20 test runs. You average the miles per gallon for the 20 test runs. Does it seem reasonable to decide on the typical miles per gallon for the automobile on the basis of this data? Why or why not?

2. Is the data in Question 1 better for drawing conclusions than the data from Question 3 in Discussion Sheet 1? Why or why not?

3. What data should you collect that would be better able to answer the question about typical miles per gallon for the car than the data in Questions 3 for Discussion Sheet 1 or Question 1 here? What makes these data better for answering the question?

4. What needs to be true in general about the data to answer a question like that about the miles per gallon a car gets in a reasonable way?
5. You decide to see how long the Mitsubishi Eclipse will run before it needs an oil change. You have a meter that for a sample drop of oil from the crank case can tell whether it is time to change the oil or not. You drive several sample runs each at 30, 40, 50, 60, 70, 80, 90, and 100 miles per hour, testing the oil every hour and recording how many hours before your meter first indicates that the oil needs changing. You calculate the average number of hours before an oil change is needed for each of the eight speeds. Do you think that the number of hours until an oil change is needed would be the same for all of the eight speeds?

6. Does it seem reasonable that there might be something like a mathematical relationship between the speed of a sample run and the number of hours before an oil change is needed?