Statistics 104 - Laboratory 2

1. In Lab 1 we looked at collecting data by sampling from a population. In this Lab we will look at collecting data by means of a designed experiment that addresses a specific question. For each of the following situations identify: the experimental units, the response variable (include the type of variable categorical (qualitative) or numerical (quantitative)), the factor that will be manipulated, the treatments e.g. levels of the factor.
   a. Does vitamin C prevent the common cold?
   b. Is Pioneer seed corn better than DEKALB?
   c. Which of two feeding plans is better for cattle growth?
   d. Which is the best tire: Bridgestone, Goodyear, or Michelin?

2. There is great debate in the medical community about the benefits of the “Atkins Diet.” This diet involves eating a large amount of protein and fats and very little carbohydrates. We would like to design an experiment to compare the weight loss achieved on the Atkins diet with the weight loss achieved while on a normal diet based on the USDA food pyramid. There are 90 people available for this experiment.
   a. What are the experimental units for this experiment?
   b. What is the response variable for this experiment? How will you measure it?
   c. What is the explanatory variable or manipulated factor for this experiment? What are the levels of the explanatory variable or factor, i.e. treatments?
   d. How will you incorporate control in this experiment? What are some variables that could influence the response? How will you control for these variables? You should discuss at least three.
   e. Explain how you can incorporate a control group in this experiment. What advantage is there for having a control group?
   f. How will you incorporate replication in this experiment that includes a control group? Be specific.
   g. How will you incorporate random assignment in this experiment that includes a control group? Be specific by giving me instructions on how you will randomly assign units to treatments.
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Group Answer Sheet

Names of Group Members: ____________________, ____________________
____________________, ____________________

1. Designed Experiments
   a. Vitamin C
      i. Experimental units.
      
      ii. Response variable including type.
      
      iii. Factor with levels (treatments).

   b. Seed Corn
      i. Experimental units.
      
      ii. Response variable including type.
      
      iii. Factor with levels (treatments).

   c. Cattle Growth
      i. Experimental units.
      
      ii. Response variable including type.
      
      iii. Factor with levels (treatments).

   d. Tires
      i. Experimental units.
      
      ii. Response variable including type.
      
      iii. Factor with levels (treatments).
2. Atkins Diet
   a. Experimental units.

   b. Response variable and how it will be measured.

   c. Explanatory variable or manipulated factor and levels (treatments).

   d. Control of outside variables.
      i. First outside variable

      ii. Second outside variable

      iii. Third outside variable

   e. How to include a control group and the advantage of a control group.

   f. Replication.

   g. Random assignment.