Chapter 4 FRQ Review

1) A publisher is interested in determining the reading difficulty of mathematics textbooks. Reading difficulty is determined by the length of sentences and the length of words used in the text. Researchers randomly select 10 paragraphs out of the most popular Algebra 1 textbooks and calculate the average sentence length and average word length for the type of mathematic textbook. Identify the population and sample.

Population: All sentences + words in alg. I textbooks
Sample: The sentences + words in the 10 paragraphs selected.

2) An alphabetized list of student names is found below. Use the random digit table provided to choose an SRS of 4 individuals. Clearly indicate how you are using the table to select the SRS.

01 Abney 06 Brock 11 Greenberg 16 Osters 21 Tyson
02 Andreaen 07 Bush 12 Knott 17 Preble 22 Wilcock
03 Bearden 08 Chauvet 13 Lacey 18 Ripp 23 Yankay
04 Bready 09 Costello 14 Martin 19 Rohnkol
05 Buckley 10 Derksen 15 McDonald 20 Sterken

Rohnkol, Wilcock, Buckley, Lacey

3) Does shoe size affect spelling ability? A recent study was conducted in a suburban school district to answer this question. 30 students from grades 1 through 8 were randomly selected. Each student was administered a spelling test and had his or her feet measured. Test scores were plotted against shoe size and a strong, positive relationship was observed.

a) Was this an observational study or an experiment? Explain. This is an observational study since no treatment was imposed.

b) What are the explanatory and response variables?
   - Exp.: Shoe size
   - Response: Spelling test scores

c) Suggest a possible confounding variable in this setting. Explain carefully how it may confound the results.
   Age of students. Older students would tend to have bigger feet and would likely test better in spelling.
4) Mr. Tyson teaches statistics to 150 students. He is interested in knowing whether or not listening to classical music while studying results in higher test scores than listening to no music. He wishes to design an experiment to answer this question.

a) What are the experimental units, explanatory variable, treatments and response variable?
   Exp. Units: Mr. Tyson's students
   Exp. Variable: listening to classical music
   Treatments: yes/no music
   Resp. Var.: test scores

b) What are potential lurking variables in this situation? How could they affect the results? How could we avoid their effects?

   Existing musical preference. Possibly students that enjoy listening to classical music are also higher performing.

c) Describe a completely randomized design for Mr. Tyson's experiment.

   150 students ➔ random assignment (by drawing names from a hat) ➔ 75 students listen to classical music while studying ➔ compare test scores
   75 students do NOT listen to classical music while studying


d) Describe an experimental design involving blocking that will help answer Mr. Tyson's questions. Explain why this design is preferable to a completely randomized design.

   Block by students in a music program already and students not in a music program. Randomly assign to treatments within each block and compare results within the block.

   This way people who are all involved in music in some way do not all get assigned to the same treatment.