Midterm

1. A marketing researcher studies the perception of colors by different nationalities. Subjects grade four colors for association with gender (0–strongly masculine; 100–strongly feminine). The researcher randomly selects one graduate school from each country and then randomly selects 50 e-mail addresses from each school to enlist study participants.

   (a) Do you see any weaknesses with this design?

   (b) Would the power to detect national differences be improved by increasing the number of students enlisted at each school?

   (c) How would you modify this study?

2. In an exercise study, 10 subjects are randomly assigned to two treatment sequences– (exercise (B), stretching (A)) and (stretching, exercise). A measure of muscle exhaustion is recorded at the end of each treatment component.

	Subject									
Period	1	2	3	4	5	6	7	8	9	10
1	A=20	A=27	B=51	A=37	B=44	B=39	B=28	A=18	B=61	A=32
2	B=30	B=45	A=40	B=47	A=30	A=25	A=19	B=27	A=50	B=48

   (a) Try testing for treatment effect, period effect, subject effect and residual effect. What do you observe? Why do you suppose this happens? Try testing the model using only treatment effect, period effect and subject effect. What do you find? Propose a model that would test which of the treatment sequences is most effective in controlling muscle exhaustion; analyze the model and report your results.

3. A researcher wants to study the effect of propeller type on gas consumption for powerboats; 4 propeller types (two apiece by two different manufacturers) will be tested. Assume the standard deviation for gas consumption is 5 gallons/hour and the researcher wants to detect a difference of 1 gallon/hour in manufacturer averages. Four boats and drivers are available for the experiment so all propeller types can be tested in a single day. What type of experiment is this? How many days should we use to detect the specified difference? ($\alpha = .05$)