Assignment #5: AxB ANOVA Exercises

1. To study the effects of a cow's age and breed on the percentage of butterfat in milk, ten cows were sampled from each of the six age-breed groups. First, calculate the main effects and the interaction effects. Then, plot the means and predict if you will find significant interaction. Create an ANOVA summary table and run a complete analysis of this data. State your conclusions.

	Guernsey	**Holstein-Fresian**	**Jersey**	
Mature	Mean = 4.85 SD = 0.503 n = 10	Mean = 3.72 SD = 0.329 n = 10	Mean = 5.24 SD = 0.547 n = 10	Mean = 4.603 n = 30
Young	Mean = 5.05 SD = 0.466 n = 10	Mean = 3.62 SD = 0.166 n = 10	Mean = 5.34 SD = 0.674 n = 10	Mean = 4.670 n = 30
	Mean = 4.95 n = 20	Mean = 3.67 n = 20	Mean = 5.29 n = 20	Mean = 4.637 n = 60

2. Do women pay more than men for haircuts? Does the price for a haircut depend on the region in which you live? The following table summarizes statistics about the price paid per haircut for 60 individuals. Run an appropriate analysis and state your conclusion.

	Female	**Male**	
Rural	Mean = 18.8 SD = 6.089 n = 10	Mean = 8.45 SD = 3.467 n = 10	Mean = 13.625 SD = 7.172 n = 20
Urban	Mean = 31.0 SD = 7.348 n = 10	Mean = 12.095 SD = 4.980 n = 10	Mean = 21.5475 SD = 11.462 n = 20
Suburban	Mean = 20.6 SD = 10.167 n = 10	Mean = 9.8 SD = 2.616 n = 10	Mean = 15.2 SD = 9.105 n = 20
	Mean = 23.467 SD = 9.5 n = 30	Mean = 10.115 SD = 3.987 n = 30	Mean = 16.7908 SD = 9.874 n = 60

3. A history professor decides to give an essay final to his class. He randomly gives blue-books to half the class and computers to the other half. In addition, the students were partitioned into three groups according to their typing ability. Answers written in blue-books were later typed and scoring was done blindly. The essays were then graded. The following table summarizes the results of this study. Run an appropriate analysis and state your conclusion.

	Blue-book	**Computer**	
No Typing Ability	Mean = 33.67 SD = 1.5275 n = 3	Mean = 34.0 SD = 2.6458 n = 3	Mean = 33.83 SD = 1.9408 n = 6
Some Typing Ability	Mean = 46.0 SD = 3.0 n = 3	Mean = 32.67 SD = 2.3094 n = 3	Mean = 39.33 SD = 7.6855 n = 6
High Typing Ability	Mean = 22.67 SD = 2.0817 n = 3	Mean = 33.0 SD = 3.0 n = 3	Mean = 27.83 SD = 6.1128 n = 6
	Mean = 34.11 SD = 10.301 n = 9	Mean = 33.22 SD = 2.3863 n = 9	Mean = 33.67 SD = 2.3863 n = 18

4. A group of students were presented with a one-week lecture on an unfamiliar topic. At the end of the week, the students were administered a test on the material from the lecture. University officials were interested in the effects of classroom size on student achievement, so they randomly assigned students to one of four groups:

   LL Group: These students received the lecture in a large classroom and were tested in a large classroom
   LS Group: These students received the lecture in a large classroom but were tested in a small classroom
   SL Group: These students received the lecture in a small classroom but were tested in a large classroom
   SS Group: These students received the lecture in a small classroom but were tested in a small classroom

   The following table displays the data from this study:

		Lecture Room	
		Small	**Large**
Test Room	**Small**	22 15 20 17 16	5 8 1 1 5
	Large	1 4 2 5 8	15 20 11 18 16

   Run an AxB ANOVA on this data and state appropriate conclusions. If a significant interaction effect exists, make sure you test for simple effects. If no significant interaction effect exists, then test for main effects.