

**Stat 401, Section F Homework 6**

**Due Date:** Wednesday, October 10

1. In a study of balloon angioplasty, patients with coronary artery disease were randomly assigned to one of four treatment groups: placebo, probucol (an experimental drug), multivitamins (a combination of beta carotene, vitamin E, and vitamin C), or probucol combined with multivitamins. Balloon angioplasty was performed on each of the patients. Later, “minimal luminal diameter” (a measurement of how well the angioplasty did in dilating the artery) was recorded for each of the patients. Summary statistics are given in the following table:

	Placebo	Probucol	Multivitamins	Probucol and Multivitamins
<i>n</i>	62	58	54	56
Mean	1.43	1.79	1.40	1.54
SD	.58	.45	.55	.61

- (a) Complete the ANOVA table below, showing all the details of how you obtained the corresponding values:

Source	df	SS	MS	F
Between Treatments		5.4336		
Within Treatments				
Total	229	73.9945		

- (b) Is there evidence that the means are different for the four treatments? Conduct an  $F$ -test and clearly state your conclusions.

2. The following table shows the weight gains (in two weeks) of young lambs on three different diets. Test the claim that Diet 3 leads to a larger weight gain than Diet 1. Also, test the claim that Diet 2 leads to a larger weight gain than Diet 3. Can you conclude which diet is better? Is there sufficient evidence that these three diets lead to different weight gains?

Diet 1	Diet 2	Diet 3
8	9	15
16	16	10
9	21	17
	11	6
	18	

3. Commercial fertilizer contains nitrogen that helps to increase corn yield. Swine manure also contains high amounts of nitrogen. Much corn is grown each year in Iowa. Also large amounts of swine manure are produced each year in Iowa. Thus it makes sense to examine the effectiveness of using swine manure as a fertilizer for corn. Researchers conducted an experiment to evaluate the effectiveness of applying swine manure to soil both with and without applying commercial fertilizer. Three levels of manure were considered (none, low, high). Two levels of commercial fertilizer were considered (absent and present). A field was divided into 30 plots of land. Five plots were randomly assigned to each of 6 treatments in a completely randomized design.

The six treatments can be described as follows:

Treatment Description:

- 1: no manure and no commercial fertilizer
- 2: low manure and no commercial fertilizer
- 3: high manure and no commercial fertilizer
- 4: no manure with commercial fertilizer (commercial fertilizer only)
- 5: low manure with commercial fertilizer
- 6: high manure with commercial fertilizer

Plots were treated in the spring and yields were recorded during the fall harvest. A summary of the grain yield data (in Mg/ha) is provided below.

Treatment	1	2	3	4	5	6
Number of plots	5	5	5	5	5	5
Average	8.3	11.3	14.0	11.0	13.9	14.1
Variance	2.6	3.3	3.1	3.3	2.9	2.8

- (a) Provide a one-way ANOVA table for this data. Include SOURCE, DF, SS, MS, and F columns in your table.
- (b) Provide a p-value for the F-statistic associated with your ANOVA table, and explain briefly what this  $p$  - value means for the question asked.