Last Name:

First Name:

SCIPER:

Practice Problems: Exercise 8 – Microengineering 110

Spring 2025

Prof. Vivek Subramanian

1. In an experiment to compare the tensile strengths of I = 5 different types of copper wire, J = 4 samples of each type were used. The between-samples and within samples estimates of σ^2 were computed as MS_T = 2673.3 and MS_R = 1094.2, respectively. Use the F test at level .05 proof or disprove the null hypothesis.

2. The following data on total Fe for four types of iron formations was found in pre-cambrian samples, obtained by geologists (1 = carbonate, 2 = silicate, 3 = magnetite, 4= hematite)

1:	20.5	28.1	27.8	27.0	28.0
	25.2	25.3	27.1	20.5	31.3
2:	26.3	24.0	26.2	20.2	23.7
	34.0	17.1	26.8	23.7	24.9
3:	29.5	34.0	27.5	29.4	27.9
	26.2	29.9	29.5	30.0	35.6
4:	36.5	44.2	34.1	30.3	31.4
	33.1	34.1	32.9	36.3	25.5

Carry out an analysis of variance F test at significance level .01, and summarize the results in an ANOVA table.

3. An experiment was carried out to compare electrical resistivity for six different low-permeability concrete bridge deck mixtures. There were 26 measurements on concrete cylinders for each mixture; these were obtained 28 days after casting. The entries in the accompanying ANOVA table are based on information obtained from this experiment. Fill in the remaining entries and test appropriate hypotheses. Note that the mixture row is the "Between treatments" row, and the "Error" row is the within treatments row, since each mixture is a different treatment, and the error is the built-in variation.

Source	df	Sum of Squares	Mean Square	f
Mixture				
Error			13.929	
Total		5664.415		

4. Six samples of each of four types of cereal grain grown in a certain region were analyzed to determine thiamin content, resulting in the following data (mg/g):

   Wheat 5.2 4.5 6.0 6.1 6.7 5.8
   Barley 6.5 8.0 6.1 7.5 5.9 5.6
   Maize 5.8 4.7 6.4 4.9 6.0 5.2
   Oats 8.3 6.1 7.8 7.0 5.5 7.2

   Does this data suggest that at least two of the grains differ with respect to true average thiamin content? Use a level $\alpha = .05$ test.