

STAT 516 - Spring 2001 - Homework 5

Due: Monday, April 2nd

1)

	Treatment				
	1	2	3	4	5
	11.6	14.5	12.3	13.9	8.5
	10.0	14.5	12.9	16.1	9.7
	10.5	13.3	11.4	14.3	6.7
	10.6	14.8	12.4	13.7	7.5
	10.7	14.4	11.6	14.9	6.7

a) (1 point) For the data given above, check that the assumptions that we can check from the residual plots are true for performing a one-way ANOVA.

For each of b and c, state why you believe the assumption that errors are independent will be met. Then, decide on the appropriate analysis (ANOVA table, Holm test, or Contrasts). Finally, conduct that analysis using $\alpha_F=0.05$ and state your conclusion. (2 points each)

b) The data are the test scores of a sample of students randomly assigned to five sections of a class taught by five different instructors (the treatments). If an award is to be given to the instructor(s) who best prepared their students, which one(s) should win?

c) The data are the miles per gallon that resulted from a fleet of test cars using different gasoline additives (the treatments). The 25 cars and drivers were randomly assigned to the five:

- 1=Additive type A, made by manufacturer 1
- 2=Additive type B, made by manufacturer 1
- 3=Additive type A, made by manufacturer 2
- 4=Additive type B, made by manufacturer 2
- 5=no additive

It is desired to compare the affect of using an additive to using no additive, to compare manufacturer 1 to manufacturer 2, and to compare type A to type B.

2) (5 points) Factorial designs are commonly used in market research to examine the effectiveness of sales strategies. In this case, the two factors are price level (regular, reduced, at cost) and size of display (normal, normal plus end of aisle display, twice normal). Each of the $3 \times 3 = 9$ treatment combinations was applied three times, for an entire week each time. Between each test week was a week at the regular price and normal display size in order to remove any effect due to the order in which the displays were changed, and holiday weeks were not used. The dependent variable was the unit sales for the week. (The data is given on the web-site.)

Use both the standard ANOVA model and regression with dummy variables to test the main effects and interactions for this two-way problem. In both cases check the assumptions and use $\alpha_F=0.05$.