ANOVA Practice Quiz

1) Describe when it would be appropriate to use multiple comparison corrections.

2) Name 2 multiple comparison corrections and in what situation they are best used.

3) Which is the easiest multiple comparison correction to calculate, how do you adjust the p-values?

4) Please describe in general what a two way interaction tests is testing?

5) Please perform one-way ANOVA for the following study data. Describe the null hypothesis, alternative hypothesis, f-table, and decision whether to reject or not.

3 classes of 4 students each were taught statistics. Each used a different text book. The principal wants to know if any book is better than the others.

Scores (out of 10) of 3 groups of students

Class 1: 5,9,6,8

Class 2: 1,2,3,2

Class 3: 5,4,8,7

Solutions

1) Several comparison tests are performed at once.

2)

Dunnett’s is used when one group is the reference to which all others are compared

Tukey-Kramer used for all pair-wise comparisons

Fisher’s Least Significant Difference is best when MSW equal in all groups

Bonferroni is best when you want easy calculations

3) Bonferroni, simply multiply p-values by the number of comparisons being tested

4) Interaction is used to measure whether an explanatory variable has a lesser or greater affect in the presence of another explanatory variable

5)

Null: There is no difference is mean scores that results in using any of the three books

Alternative: At least one book produces better or worse scores than the others

n=12

r = number of groups =3

Mean(1) = 7

Mean(2) = 2

Mean(3) = 6

Overall mean = 5

SSB = 4\*(7-5)2 + 4\*(3-5) 2+ 4\*(6-5) 2= 56

MSB = SSB/(r-1) = 56/2 = 28

SSW = (5-7)2+ (9-7)2+(6-7)2+(8-7)2+(1-2)2+(2-2)2+(3-2)2+(2-2)2+(5-6)2+(4-6)2+(8-6)2+(7-6)2

= 22

MSW = SSW/(n-r) = 22/9 = 2.44

Analysis of Variance Table (F-table)

df SS MS F p-value

Group (between) 2 56 28 11.4 0.0034

Residuals (within) 9 22 2.44

F=11.4; compare to critical value F(2,9,0.95) = 4.26; F is greater than critical value, so reject the null that all three texts produce the same mean scores.