

Homework V  
One-Way Anova

Due: 4/12/04

1. Determine the number of paired comparisons that would be required to fully test the Null Hypothesis for the following situations. Also, for each situation report the mean pairs that would need to be tested.

- a. 3 groups    b. 5 groups    c. 7 groups    d. 10 groups

2. Report the Per Experiment Error Rate for each of the situations reported in exercise 1.

2. Using Cartoon 1 as a backdrop for the data found in Table 1, let's say our current research interests are whether different types of sex education have an effect on correct responses given on a sex education test (20 questions). From the population, we sample three groups of eight from our 9th grade students ( $N = 24$ ). Respondents in group 1 are given traditional sex education, and then tested. Respondents in group 2 are given traditional sex education combined with stork-theory teachings, and then tested. Finally, respondents in group 3 are considered our control group-no treatment was given, and they are simply tested.

Table 1          Sex Education Data

*One-way ANOVA for Numbers of Sex Ed. Test Questions Correct*

Group 1			Group 2			Group 3		
s	$X_{.1}$	$X_{.1}^2$	s	$X_{.2}$	$X_{.2}^2$	s	$X_{.3}$	$X_{.3}^2$
X11	18		X12	12		X13	7	
X21	14		X22	10		X23	6	
X31	11		X32	8		X33	7	
X41	13		X42	8		X43	8	
X51	14		X52	11		X53	5	
X61	16		X62	9		X63	6	
X71	20		X72	8		X73	7	
X81	14		X82	9		X83	9	
GX <sub>.1</sub>			GX <sub>.2</sub>			GX <sub>.3</sub>		
GX <sub>.1</sub> <sup>2</sup>			GX <sub>.2</sub> <sup>2</sup>			GX <sub>.3</sub> <sup>2</sup>		
$(n_1=8)$			$(n_2=8)$			$(n_3=8)$		

(All for randomly selected respondents given a sex education test)

Group 1 = Traditional sex education.

Group 2 = Traditional sex education and stork-theory teachings.

Group 3 = Control, given no treatment (no sex education).

- a. Using the 16 steps for undertaking ANOVA, construct an ANOVA Summary Table for this data set.
  - b. Is there a significant difference between two (or more) of the groups? Why?
2. Upon completion of the above, calculate the LSD  $t$ -test values comparing each group (3  $t$ -tests). Also, indicate whether the obtained  $t$  values are significant at the 99% confidence level ( $\alpha = .01$ ).

3. Table 2 is an ANOVA Summary Table for two groups with 20 respondents in each ( $N = 40$ ). Fill in all of the missing values. (Remember: Although ANOVA was created and is most often utilized in situations where three or more group means are present, it can be used to compare just two groups.)

Table 2 ANOVA Summary Table for Two Groups of 20

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between					
Within	380				
TOTAL	410				

4. The following is an ANOVA Summary Table (Table 3) for four groups with 10 respondents in each ( $N = 40$ ).

Fill in the missing values.

Table 3 ANOVA Summary Table for Four Groups of 10

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between	4,800				
Within					
TOTAL	19,200				

5. The following is an ANOVA table (Table 4) for three groups with 11 respondents in each ( $N = 33$ ). Fill in the missing values.

Table 4 ANOVA Summary Table for Three Groups of 11

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between				8.34	
Within	90				
TOTAL					

6. In Practice Exercise 5, let's say we are also given the following information:

$$O_1 = 22; O_2 = 16.5; O_3 = 11$$

Using this combined information and the appropriate test ( $\alpha = .05$ ), is there a significant difference between the groups?