

Name: _____
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Assignment 3

Part I

1. Assume that you are comparing the GPAs of students from 3 departments, Engineering, Mathematics, and Physics. If the Mean GPA in Engineering = 3.37, and the F-ratio of the appropriate ANOVA statistic = 1.00, then what is the Mean GPA of:
 - a. Students in Mathematics?
 - b. Students in Physics?

§ Read the following and answer questions 2-3:

The Dean of the College of Education has asked you to assist with her research. She is comparing traditional teaching techniques for reading comprehension to two other methods. To this end, she exposed 3 groups of children (10 per group) to each of 3 teaching techniques, and measured their reading skills after a set period of time. You analyzed the data with the appropriate ANOVA test, and were on your way over to her office with the SPSS printout, when you spilled coffee all over your printout. The accident made your ANOVA summary table unreadable, except for only a few key items. Below is the result of this unfortunate waste of Starbucks. You could always delay your meeting with the Dean and re-run the analysis, but knowing how the Dean HATES missed meetings, reconstruct the ANOVA table with your knowledge of the components of the table and state the null and alternative hypothesis.

2. In symbols and words, what are the null and alternative hypotheses?
3. Complete the following ANOVA table:

	SS	df	MS	F	P ($\alpha=.05$)
Between Groups	24				
Within Groups			2		
Total					
4. What is your decision regarding the hypotheses (please interpret your conclusion)?
5. (Exercise 3.1 in Keppel & Wickens). Find the critical values of F for the following situations:
 - a. $F(4, 30)$ at $\alpha=.05$;
 - b. $F(1, 120)$ at $\alpha=.001$;
 - c. $A=7, n=5, \alpha=.10$;
 - d. $A=3, n=9, \alpha=.01$.
6. Using Excel (or some other statistical package) compute the following exact p-values:
 - a. $F = 10.45, df_A = 4, df_{S/A} = 30$
 - b. $F = 3.00, df_A = 1, df_{S/A} = 120$
 - c. $F = 5.26, df_A = 6, df_{S/A} = 29$
 - d. $F = 3.00, df_A = 2, df_{S/A} = 25$

7. (Exercise 3.4 in Keppel & Wickens). Occasionally you will want to reconstruct parts of someone else's analysis, either to verify some of the calculations or to conduct additional tests. This is relatively simple if you have available the treatment means and some measures of variability such as the group standard deviations. Suppose you wanted to compare the results of the experiment reported in Table 3.5 (p. 51) with another study that included only the first three conditions (4 hr., 12 hr., and 20 hr.). Perform an analysis of variance on these three groups, using only the means and standard deviations. Complete the entries in the following ANOVA table:

	SS	df	MS	F	P ($\alpha=.05$)
Between Groups					
Within Groups					
Total					

Part II (SPSS)

A researcher believes that the type of assignments given to students makes a difference in how well the student knows the material. She decides to randomly select 10 students to only have assignments that are project-based, 10 students to only have assignments that require pure memorization, and 10 students to only have assignments in the form of essay writing (all for a psychology class). After a semester of each group being taught with assignments only allowed for their group, a final exam is administered to score how well the students know the material.

The data is below.

Project-Based	Pure Memorization	Essay Writing
96	82	92
90	89	93
92	91	94
88	88	96
98	90	86
92	93	91
93	82	96
97	85	87
90	81	91
85	83	85

- Write the null hypothesis in symbols and words.
- How many degrees of freedom are there:
 - For the between group sums of squares?
 - For the within group sums of squares?

3. Run in SPSS a one-way analysis of variance. What is your decision regarding your hypothesis test? Provide and explain the evidence you have to support your decision.
4. Looking at the ANOVA table, what numbers would you use to calculate the F value?