

PSYC 240: Statistics in Psychology
ASSIGNMENT 6: ANALYSIS OF VARIANCE

Purpose: A very common problem in statistics involves comparing *more* than two groups or samples. This assignment is designed to give you practice in thinking about and determining the statistical significance of the outcome of multi-group experimental and nonexperimental studies.

Short Essay Question (20 pts.): Please provide a typewritten answer to the following essay question:

1. How is the total variability in a set of scores partitioned in a one-way ANOVA? Using a concrete example, describe the meaning or interpretation of each of the sources of variance. [Hint: You may wish to use the problems below to aid in answering this question.]

Problem-Based Questions (40 pts. each): Please show all work and clearly identify the final answer for each of the following questions.

Study 1 (Experimental). Suppose a cognitive psychologist was interested in the effect of sleep deprivation on the ability to detect moving objects on a radar screen. The 20 subjects were randomly assigned to one of 4 different treatment conditions (4, 12, 20, and 28 hours without sleep). The data consists of the number of failures in spotting moving objects during a test period.

	<u>4 Hours</u>	<u>12 Hours</u>	<u>20 Hours</u>	<u>28 Hours</u>
	36	37	44	75
	21	45	72	65
	20	46	66	61
	26	22	60	44
	22	40	58	60

2. Given the data for the study above, use SPSS (or by hand if you can't access SPSS) to obtain the descriptive statistics, and an Analysis of Variance source table (using $\alpha = .05$).
 - a. Calculate the elements of the source table (and eta-squared) using the descriptive statistic information given to you.
 - b. Describe your findings in an appropriate APA-style Results section. Be sure to interpret the findings of the study. What do the analyses tell you about the difference between the groups?

Study 2 (Nonexperimental). Suppose that a developmental psychologist is interested in the relationship between the type of attachment (secure, etc.) exhibited by infants and maternal behavior. Trained observers watched interactions between mothers and infants and rated these interactions on a 9-point scale (where higher numbers representing greater sensitivity toward the infants).

	<u>Secure</u>	<u>Avoidant</u>	<u>Ambivalent</u>
	5	1	3
	9	5	3
	9	1	1
	5	1	1
	9	5	3
	5	5	1

3. Given the data for the study above, use SPSS (or hand calculation) to obtain the descriptive statistics and an ANOVA source table (using $\alpha = .05$).
 - a. Calculate the elements of the source table (and eta-squared) using the descriptive statistic information given to you.
 - b. Describe your findings in an appropriate APA-style Results section. Be sure to interpret the findings of the study. What do the analyses tell you about the difference between the groups?