

(Do not put your name on this exam.)

SHOW YOUR WORK!

- Professor Paparazzi is interested in the effectiveness of advertising. Assume that previous research suggests that celebrity endorsement is an effective method of advertising. Professor Paparazzi has a specific hypothesis that the effectiveness of advertising increases with the number of celebrity endorsements. He decides to isolate a single product of general interest and produce five different TV commercials for that product. In each of the ads, 0, 1, 2, 3, or 5 celebrities endorse the product. Participants are randomly assigned to view one of the five ads. After seeing an ad, participants are asked how much they would be willing to pay (in dollars) for the product over a generic alternative. Seven people are randomly assigned to each condition of the experiment.

Number of celebrity endorsements				
0	1	2	3	5
2	4	7	1	2
5	7	6	2	0
6	4	8	1	2
4	7	6	3	1
5	7	8	3	1
6	8	5	4	0
7	5	9	0	1
Sum = 35 Mean = 5.000	Sum = 42 Mean = 6.000	Sum = 49 Mean = 7.000	Sum = 14 Mean = 2.000	Sum = 7 Mean = 1.000

$$MS_{S/A} = 2.000$$

- (20 points) Construct a contrast to test Professor Paparazzi's hypothesis, calculate the test, and interpret your results.

- b. (20 points) Suppose that Professor Praktikal hypothesizes that there is an optimal number of celebrities to have in an ad. She thinks that less or more than two celebrities would lead to lower willingness to pay for the product. Construct a contrast to test this hypothesis, calculate the test, and interpret your results.

- c. (10 points) Now that you have tested two apparently conflicting hypotheses, draw an overall conclusion from your results. Whose hypothesis is correct—Paparazzi or Praktikal? Is there something else you could test other than the contrasts in (a) and (b) to settle this question?
- d. (15 points) Use the Fisher-Hayter method to test the difference between the effects of two and three celebrity endorsements, and draw a conclusion.

2. You are reviewing a study that investigates the effectiveness of instruction on students' math achievement. Math achievement was assessed after students participated in one of three instructional conditions: classroom instruction, one-on-one instruction, and no instruction. Ten students were assigned randomly to each condition. The condition means (M) and standard deviations (SD) were reported in the manuscript as follows: classroom instruction (M = 21.00, SD = 5.00), one-on-one instruction (M = 24.00, SD = 4.00), and no instruction (M = 12.00, SD = 4.00).

The manuscript was submitted via the new web-based submission system, and unfortunately, the word-processing software was incompatible and parts of the ANOVA table were obliterated.

Source	df	SS	MS	F
Mean				45.00
A				
S/A				
"Total"				

- a. (25 points) Fill in the blank spaces in the ANOVA table above. (Make sure you show your work.)

- b. (15 points) Calculate the standard error of the mean for each condition.
- c. (5 points) Describe another method for calculating the standard errors of the means, and explain how this method differs from the method you used in (b).

The authors drew the following conclusions. “Using a significance level of $\alpha = 0.05$, the critical value of the F-statistic is 3.36. Because this critical value is greater than 1 (1 is the value we would expect if the null hypothesis were true), we reject the null hypothesis. The p-value associated with our calculated F-statistic is far less than 0.001, so there is an overwhelming probability that the population means for these conditions are not equal. This is consistent with our previous studies of the influence of instruction on students’ math achievement. Indeed, in the current study, the F-test offers further evidence to support our hypothesis that one-on-one instruction differs significantly from group instruction.”

- d. (20 points) Find three problems in the author’s conclusions presented above. Identify the problems and explain the flaw in reasoning for each. You may assume that the stated p-value and critical value are correct.

