

Midterm - Psych 465 (Sample -- Key is at the end)
Dr. Marelich (revised 3-25-02)

Directions: Welcome to the midterm. Please use the space provided below each item to complete any calculations...if you need more space, use the back of the page. You have 1 hour and 15 minutes to complete the exam. Make sure you interpret your results where needed!

1. The sales manager of a small computer company has just hired some new sales representatives for the firm's line of laptop computers. From experience, the manager knows that an average sales representative will make one sale for every five customers approached (i.e., null hypothesis). Assume that each customer is independent of the others.

If a new employee approaches five customers and sells a computer to four of them, is this new employee selling significantly better than the average? Interpret your results.
(10 pts)

2. Research rats may be purchased from five suppliers. In how many ways can three suppliers be chosen from the five? Interpret your results. (10 pts)

3. Please list the statistical assumptions associated with:

a. Chi-Square (5 pts)

b. ANOVA (5 pts)

4. The following one-way ANOVA summary table needs to be completed. You have a main effect (A), and a dependent variable (DV). Effect A has 5 levels. Assume equal cell-size. Is your F-value sig? What is your critical value at a .05 alpha level? What is the eta-square value in this table? How would you interpret it? (20 pts)

Source	SS	df	MS	F	CV	Eta-square
A	100.00	___	_____	8.00	___	_____
Error	300.00	96	3.125			
Total	400.00	100				

* $p < .05$

5. Let's say you wanted to do a Tukey post-hoc test on the design above. What would be the studentized range statistic value? (10 pts)

6. Let's say you had a factorial design, a 2x2 or A x B design, and you note a significant interaction term. You must now conduct a simple effects test. I have started SPSS MANOVA syntax language for such testing below. Please complete the syntax for MANOVA -- your goal is to investigate group (mean) differences in Effect B within levels of Effect A. (5 pts)

```
MANOVA DV by A (1,2) B(1,2)
      /method=unique
      /design _____.
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7. When would you use a post-hoc Scheffe test AFTER a simple effects test? (5 pts)
8. Assume you are going to do a One-way ANOVA with 4 levels of your IV. You calculate a family-wise error rate of .50. Did you make the correct calculations assuming an alpha level of .05? Why/Why not? (5 pts)
9. You are interested in comparing groups on scores of romantic jealousy. You have two groups (men and women), and jealousy is rated on a scale of 1-9 (9 indicates great jealousy). The mean for your sample men is 6.5 ($n = 30$, variance of 3), and your mean for women is 6.0 ($n = 30$, variance of 2). Your hypothesis is that men and women differ in their romantic jealousy. What statistical test would you use to test this hypothesis? Please do the test. Do you have significant differences at the .05 level (two-tailed)? Provide your critical value! Interpret your findings! (15 pts)

10. Let's say you have an IV with 3 levels -- hence you have 3 means (A, B, C). Please write a complete set of orthogonal contrasts, comparing first Means A/B with C, and then finishing the comparisons with A vs. B. Make sure you assign values for the contrasts (like -1, 0, etc.). (10 pts).

Key:

1. It's a BINOMIAL. $N = 5, r = 4, p = .20, q = .80$.
You have to first calc $4/5 = .0064$
Then you have to calc $5/5 = .00032$
Then you add them up $.0064 + .00032 = .0067$, which is less than .05, so sig.

2. It's a combination.
 $\frac{5!}{3!2!} = 10$ combinations

3. Chi-square: Independence, normality, inclusion of nonoccurrences, some mention of small cell frequencies being problematic.
ANOVA: Homogeneity of variance, normality, independence of observations, equal cell sizes.

4.

Source	SS	df	MS	F	CV	Eta-square
A	100.00	4	25.00	8.00	2.45	.25
Error	300.00	96	3.125			
Total	400.00	100				

*p < .05 - note the CV was found at (4,120) DF

5. Find it at 5-steps (5-levels of the IV), and the MSerror DF (96) = 3.92 (found really at 5,120)

6. MANOVA DV by A (1,2) B(1,2)
/method=unique /design A, B w A(1), B w A(2).

7. You would use the Scheffe post-hoc test AFTER a simple effects test when you had three or more mean differences to investigate.

8. $FW = 1 - (1 - \alpha)^{\text{total number of mean comparisons}}$
So assuming .05 alpha level and 6-total comparisons:
 $1 - (1 - .05)^6 = .26$ FW error rate...so your first calc of .50 was wrong.

9. This is a t-test – apply the separate variance estimate formula
Df = 58, CV = 1.98 (at 100df)
 $t = \frac{6.5 - 6.0}{\text{sqrt}(3/30 + 2/30)} = .5/.408 = 1.214$, which is < 1.98, so nonsig.

10. Contrasts
(A,B) vs. (C) (1 1 -2)
(A) vs. (B) (1 -1 0)