

Name: _____

TA: _____

Code name: _____

Final Exam
FORM 1
Spring 2002

{{ Please Note: all **alpha levels are .05**,
show all of your work on **another piece of paper** } }
This ONLINE PDF file has multiple pages, including an answer key

1. A statistics instructor had two textbooks in mind (call them text 1 and text 2), one of which would be adopted by the psychology department as the standard text for Psych 3000. The department wondered whether there was any real difference in mean student grades between the two textbooks. The instructor decided to investigate by using text 1 with section one of the class and text 2 with section two of the class. Students were randomly selected for assignment to the two sections. These sections can be viewed as samples from the population of interest.

Mean Course Grades

Textbook	# of students (n)	Sample mean (M)	Sample standard deviation (S)
1	35	78	8
2	40	75	6

- (2) A) State the skeptical hypothesis.
- (2) B) State the scientific hypothesis.
- (5) C) Is the hypothesis directional or non-directional?
- (20) D) Choose **and calculate** a test statistic to test the hypothesis.
- (3) E) What are the degrees of freedom?
- (3) F) What is the critical value (use lower value if exact df is not on table)?
- (5) G) Do you reject or not reject the null?

2. In Las Vegas there are all kinds of ways of cheating at gambling. One way is to use fixed dice. A fixed die is one that has one number occurring more frequently than any other. In the game of craps it is a good thing when you get snake eyes, which is when both dice are ones. So a cheater fixed the dice so ones would show up more frequently than any other number, but he got caught and swallowed one of the dice before security could get a hold of both of them. Now the security and casino owners want to know if the remaining die was fixed so they rolled the die 50 times and this is what they ended up with:

Side of the die facing up:	1	2	3	4	5	6
Frequency:	20	7	8	6	4	5

- (6) A) State the null hypothesis H_0 .
- (6) B) State the alternative hypothesis H_1 .
- (10) C) What test statistic would you use?
- (4) D) Calculate the degrees of freedom.
- (4) E) What is the critical value?

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3. Using your knowledge of 2-Way ANOVAS,

	IV ₂ Level 1	IV ₂ Level 2	IV ₂ Level 3
IV ₁ Level 1	6	8	10
IV ₁ Level 2	4	2	0

(15) A) Graph the data in the cells (in one graph)

B) Make a decision, using both the data and the graph, whether each of the effects listed below is present **and** justify your answer:

(5) a. Main effect for IV1

(5) b. Main effect for IV2

(5) c. Interaction

1. A) There will be no difference in results between the two textbooks. $H_0: \sum(\mu_j) = 0$ for all μ_j
- B) There will be a difference in results between the two textbooks. $H_1: \sum(\mu_j) \neq 0$ for some μ_j
- C) Non-directional
- D) t-test for independent means

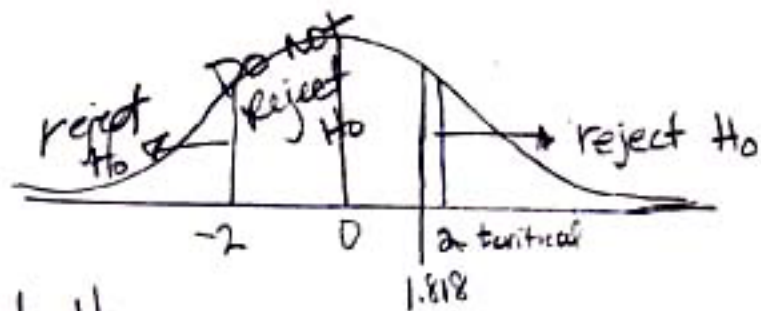
$$t = \frac{M_1 - M_2}{\sqrt{\frac{n_1 S_1^2 + n_2 S_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} = \frac{78 - 75}{\sqrt{\frac{35(8)^2 + 40(6)^2}{35 + 40 - 2} \left(\frac{1}{35} + \frac{1}{40} \right)}}$$

$$= \frac{3}{\sqrt{\frac{2240 + 1440}{73} (.029 + .025)}} = \frac{3}{\sqrt{\frac{3680}{73} (.054)}}$$

$$= \frac{3}{\sqrt{2.722}} = \frac{3}{1.65} = \underline{\underline{1.818}}$$

E) $df = n_1 + n_2 - 2$
 $= 35 + 40 - 2$
 $= 73$

F) $t_{critical} \alpha = .05$ $df 60 = \pm 2.0$
 $df 120 = \pm 1.98$



G) Do not reject H_0

2. A) $H_0: E(f_i - f_e) = 0$

B) $H_1: E(f_i - f_e) \neq 0$

C) χ^2 Goodness of Fit (NOT REQUIRED TO CALCULATE ON EXAM)

$$f_{e_j} = \frac{1}{6}(50) = 8.33$$

$$\chi^2 = \sum_j \frac{(f_{o_j} - f_{e_j})^2}{f_{e_j}}$$

$$= \frac{(20 - 8.33)^2}{8.33} + \frac{(7 - 8.33)^2}{8.33} + \frac{(8 - 8.33)^2}{8.33} + \frac{(6 - 8.33)^2}{8.33}$$

$$+ \frac{(4 - 8.33)^2}{8.33} + \frac{(5 - 8.33)^2}{8.33}$$

$$= \frac{136.19 + 1.77 + .109 + 5.42 + 18.75 + 11.09}{8.33}$$

$$= \frac{173.33}{8.33}$$

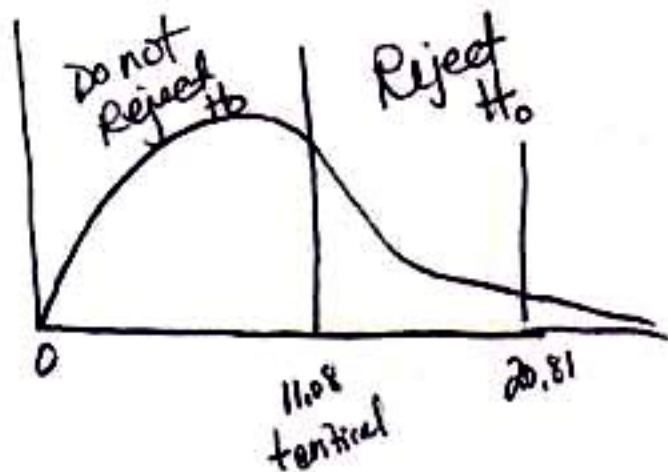
$$= \underline{\underline{20.81}}$$

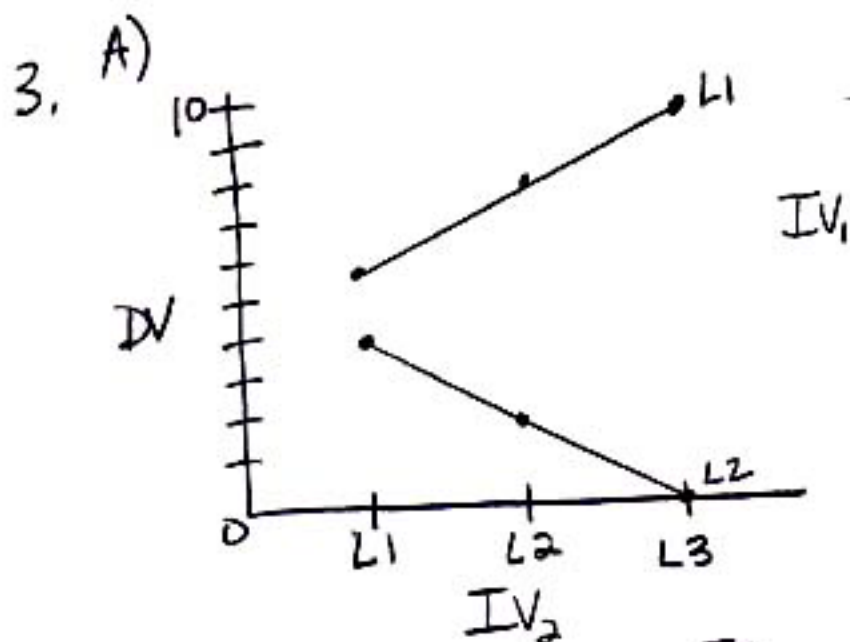
D) $df = j - 1$

$$= 6 - 1 = \underline{\underline{5}}$$

E) $\chi^2_{critical} = 11.0705$

F) reject H_0





B)

		IV ₂			
		L1	L2	L3	
IV ₁	L1	6	8	10	n=8
	L2	4	2	0	n=2
		$\bar{m}=5$	$\bar{m}=5$	$\bar{m}=5$	

- a) There is a main effect for IV₁
there is a difference in the means of Level 1 and Level 2.
- b) There is no main effect for IV₂ -
there is no difference in means across the three levels of IV₂
- c) There is an interaction effect
the lines are not parallel