Name_____ Section_____

Psychology 317 Exam #4
March 6, 2006

Instructions

1. Use a pencil, not a pen
2. Put your name on each page where indicated, and in addition, put your section on this page.
3. Exams will be due at 9:20!
4. If you find yourself having difficulty with some problem, go on to the rest of the problems, and return to the troublemaker if you have time at the end of the exam.
5. Leave your answers as reduced fractions or decimals to three decimal places.
6. **CIRCLE ALL ANSWERS: You will lose credit if an answer is not circled!!**
7. Check to make sure that you have all questions (see grading below)
8. **SHOW ALL YOUR WORK: An answer that appears from nowhere will receive no credit!!**
9. Don't Panic!
10. Good luck!

Grading

Problem	Points	Grader
1	40	Serena
2	35	Ren
3	25	Katie
TOTAL	/100	

Name_____ Section_____

1. Based on years of record keeping, it is known that the average final exam score in Professor Popover's class is normally distributed with a mean, $\mu = 70$ and a variance, σ^2, of 121.

Popover has switched to a new, web-based teaching method. However, Popover is worried that students won't pay enough attention to the class while on the web and that the class mean final score will *decrease*. Based on some assumptions he worries that in particular, it will decrease to a mean of $\mu_W = 67$.

During the first year of teaching, a sample of n=25 students take the class. Popover plans to use their final exam scores to determine whether the new teaching method is decreasing the score as he had feared.

a) What are appropriate null and alternative hypotheses for dealing with this question? (5 points)

H_0:

H_1:

b) What would be an appropriate summary score to use for deciding between these hypotheses? (5 points)

c) Using the ***$\alpha = 0.25$*** level, what is the criterion summary score that would determine whether Popover would reject H_0 or fail to reject H_0? (20 points)

d) What are β and power for the test that you designed for part (c)? (10 points)

Name_____ Section_____

2. Green newts have lengths that are normally distributed with a population mean, μ_G of 5 cm, and a standard deviation, σ of 0.50 cm.

a) Consider the interval under the length distribution, whose upper bound is 5.95 cm, and which contains 30% of green newt lengths. What is the lower bound of this interval (in cm)? (15 points)

b) Suppose that in addition to green newts, there are also red newts. However, nothing is known about red newt lengths. So, you plan an experiment to study whether red newts have lengths whose population mean, μ_R, differs the green population mean that is known to be $\mu_G = 5$. You want n, the number of red newts in the sample, to be such that the sample mean length, M, will come from a sampling distribution of sample means whose standard error, σ_M, is equal to 0.10 cm. What should n be? Assume that the population standard deviations, σ, are the same for green and red newts. (10 points)

Problem 2 continues on the next page ☞

Name_____ Section_____

c) Assuming the correct sample size from Part (b), suppose that in your experiment you got a mean red newt length, M of 5.3 cm. Compute a 95% confidence interval around this mean. (10 points)

Name_____ Section_____

3. The Austin Runner's Collective (ARC) is investigating how running speeds are affected by various factors. The ARC has mapped out a one-mile route, and it is known from long experience that running time along this route is normally distributed with a standard deviation, σ_S, of 2.25 minutes in the summer, but with a standard deviation σ_W of 1.00 minute in the winter. (NOTE: Having unequal standard deviations like this is *not* a situation that has been discussed in class; you will have to figure out the consequences of it on your own. But this shouldn't be very hard).

The question is: Is the population mean running time greater in the summer heat than in the winter? To test this question a random sample of $n_S = 15$ summer runs are compared with a sample of $n_W = 60$ winter runs. The mean running times are $M_S = 8.5$ minutes for the summer and $M_W = 8.2$ minutes for the winter.

Test the null hypothesis that the population mean running time doesn't differ in summer compared to winter against the alternative hypothesis that running time is ***greater*** in summer compared to winter. ***Use the $\alpha = 0.15$ level***.

IMPORTANT NOTE: List, as part of your answer, all hypothesis testing steps. Make sure you include the variance and the standard error of the distribution from which your summary score is drawn, the criterion summary score or criteria summary scores, the obtained summary score, the decision rule, and the decision.

(25 points)