## Psychology 318 Exam #1

## April 6, 2009

### 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 10:20!

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. **NEW INSTRUCTION: ALWAYS ASSUME HOMOGENEITY OF VARIANCE UNLESS TOLD OTHERWISE.**

11: **ALWAYS INDICATE DEGREE OF FREEDOM IN YOUR ANSWERS WHENEVER IT IS APPROPRIATE.**

12. Good luck!

### Grading

Problem Points Grader

1a-c 30 Zach

2a-d 45 Andy

3a-d 25 Courtney

TOTAL /100

1. Bark-B-Gone, Inc., claims that it can train dogs to bark less using its training program. To test its claim, eight dogs are selected. Their bark rate (barks per hour or bph) is measured both before and after the Bark-B-Gone training. Data for the eight dogs are as follows.

|  |  |  |  |
| --- | --- | --- | --- |
| Dog | Before training | After training | Difference |
| 1 | 39 | 36 | 3 |
| 2 | 17 | 14 | 3 |
| 3 | 85 | 79 | 6 |
| 4 | 78 | 80 | -2 |
| 5 | 48 | 44 | 4 |
| 6 | 48 | 51 | -3 |
| 7 | 22 | 19 | 3 |
| 8 | 23 | 20 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

a) Test the alternative hypothesis that the Bark-B-Gone training procedure *reduces* bph against the null hypothesis that it doesn’t. Use the 0.05 -level. Be sure to tell us what your obtained t, your criterion t, and your obtained summary score, your criterion summary score are. Be sure also to state your decision. (10 points)

Problem 1 continues

Problem 1 (continued)

b) Compute the ***99%*** confidence interval around your summary score. Explain why there is any mismatch between the results of your hypothesis test and the results of your confidence interval. (15 points)

c) Suppose that the Bark-B-Gone literature claims that after its training procedures, dogs bark **an average of 2 bph less than before training**. Use this claim as a null hypothesis and test it against the alternative hypothesis that the average decrease is ***different from*** the advertised mean effect of 2 bph. Use the 0.05  level. Be sure to tell us what your obtained t, your criterion t, and your obtained and criterion summary scores are. Be sure to state your decision. (5 points)

2. The Bark-B-Gone company decides to use two different methods, Method 1 and Method 2 to reduce barking. Two groups of dogs with n1 = n2 = 10 dogs per group are used in the experiment. The data—here **reduction** in barking following each of the two methods—are as follows. Note that Xij refers to the ith score in the jth group. The lower rows of the table provide summary statistics for each group, including n, degrees of freedom, mean, sum, and sum of squared scores.

|  |  |  |
| --- | --- | --- |
| Method 1 | Method 2 |  |
| 1 | 10 |  |
| 3 | 9 |  |
| 1 | 9 |  |
| 2 | 7 |  |
| 4 | 9 |  |
| 0 | 10 |  |
| 4 | 10 |  |
| 6 | 12 |  |
| 5 | 8 |  |
| 4 | 11 |  |
| 10 | 10 | nj |
|  |  | dfj |
| 3.00 |  | Mj |
|  | 95.00 | SXij |
| 124.00 | 921.00 | SXij2 |

a) Fill in the missing (shaded) cells in the data table above. (4 points)

b) Test the null hypothesis that there is no difference between the two methods against the alternative hypothesis that there is a difference. Use the  = .02 level. Be sure to indicate your criterion and obtained t’s along with your criterion and obtained summary scores. Be sure to state your decision. (16 points)

Problem 2 continues Problem 2 (continued)

c) Compute 98% confidence intervals around M1 and your obtained summary score. (14 points)

d) Do not assume homogeneity of variance. Compute a 98% confidence interval around M1. (11 points)

3. Bark-B-Gone replicates Experiment-1. However all but one of the Method-2 dogs run away. The remaining data are as follows.

|  |  |  |
| --- | --- | --- |
| Method 1 | Method 2 |  |
| 3 | 10 |  |
| 2 |  |  |
| 7 |  |  |
| 5 |  |  |
| 1 |  |  |
| 7 |  |  |
| 3 |  |  |
| 2 |  |  |
| 2 |  |  |
| 3 |  |  |
| 10 | 1 | nj |
|  |  | dfj |
| 3.50 |  | Mj |
|  | 10.00 | SXij |
| 163.00 |  | SXij2 |

a) Fill in the missing (shaded) cells in the data table above. (2 points)

b) Perform the appropriate test to determine whether there is any ***difference*** between the two methods. Use the  = .02 level. Be sure to indicate your criterion and obtained t’s along with your criterion and obtained summary score. Be sure to state your decision.(12 points)

Problem 3 continues Problem 3 (continued)

c) Compute 98% confidence intervals around M1 and your obtained summary score. (6 points)

d) Do not assume homogeneity of variance. Compute a 98% confidence interval around **M2**. If you can't compute such a confidence interval, explain why not. (5 points)