Stats Homework Assignment 1 James Young

**Problem 1**

**1) State the Problem**:

(from p. 236) Two sections of a class in statistics were taught by two different methods. Students’ scores on a standardized test are shown in Table 5.12. Do the results present evidence of a difference in the effectiveness of the two methods? (Use *α* = 0.05.)

Problem to examine

Did one of the two teaching methods result in significantly higher or lower scores on standardized tests when evaluated at α = 0.05?

**2) Appropriate Test**

On p. 213 we choose the t’ statistic as the appropriate test. As discussed in lecture, this test makes less assumptions than the pooled t test and allows us to work with variance unknown and unequal between two samples.

**3) Test Equation**

The equation for a t’ test statistic:

Where , subscript x represents the sample, and, in this case, (n-1) of the lesser sample size = degrees of freedom, by way of assumption 2 (p. 213).

**4) State the Assumptions of the Test**

1. Variances unknown but not equal

2. Normal distribution

3. If either sample is not large, then both samples distribution must be normal to use the two-sample t test. In this case, degrees freedom is that of the smaller sample.

**5) State the Hypothesis**

H0:

H1:

**6) Calculate the Statistic**

**7) Decision Rule (Step 4 from 3.2.7)**

The t value from the table with α = 0.05 and 11 degrees of freedom (df based on assumption 2) is 1.7959.

Since the calculated t value of 1.22<1.7959 we fail to reject H0 and conclude that neither of the classes have a significantly higher mean of standardized test score.

**8) Interpret the results in the Context of the Problem**

There is not sufficient evidence that one of the teaching methods used in this experiment are significantly better than the other when judging standardized score tests and using α=0.05.

**9) Construct a Confidence Interval**

The confidence interval for the mean standardized test score

Satterthwaite-Welch test for df

= = 22.68 = 23 df

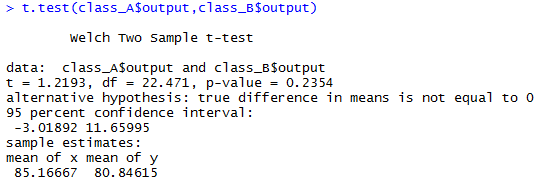
where has 23 df

This is a two-tailed hypothesis

4.3205(2.0687)(3.5433)= 7.330

Thus the LCL = -3.0 and the UCL = 11.7, H0 falls within CI which supports the fail to reject conclusion.

**10) Verify the Results Using the R Output**



The R results show the t value is 1.2193 and p-value is 0.2354. Since the p-value is numerically higher than the significance level of 0.05, we fail to reject H0 and conclude neither of teaching methods used in the sampled statistic classes provide a significant advantage over the other method.

**Problem 2**

**1) State the Problem**

(From p. 237) To assess the effectiveness of a new diet formulation, a sample of 8 steers is fed a regular diet and another sample of 10 steers is fed a new diet. The weights of the steers at 1 year are given in Table 5.14. Do these results imply that the new diet results in higher weights? (Use *α* = 0.05.)

Is the new diet effective? Based on the data given, weight must be the measure of effectiveness, with increased weight being the desired outcome.

**2) Appropriate Test**

The Welch test is the appropriate statistic. It is similar to t’ but usesAs discussed in lecture, this test makes less assumptions than the pooled t test and allows us to work with variance unknown and unequal.

**3) Test Equation**

The equation for a two-sample t test:

Where , subscript x represents the sample, and, in this case df is calculated with Welch-Satterthwaite equation (step 9).

**4) State the Assumptions**

1. Both n1 and n2 are large (30 or more, according to book). This is false in this case.

2. If either sample is not large, then both samples distribution must be normal to use the two-sample t test. In this case, degrees freedom is that of the smaller sample.

**5) State the Hypothesis**

H0:

H1:

**6) Calculate the Statistic**

3

**7) Decision Rule (Step 4 from 3.2.7)**

The t value from the table with α = 0.05 and 15 degrees of freedom is 1.7531.

Since the calculated t value of 3.076>1.7531 we reject H0 and conclude that the new diet is effective in putting on more weight than the regular diet.

**8) Interpret the results in the Context of the Problem**

There is sufficient evidence that the new diet used in this experiment is significantly more effective than the regular diet when judging weight and using α=0.05.

**9) Construct a Confidence Interval**

Satterthwaite-Welch equation

= = 14.5238 = 15 df

The confidence interval for the mean standardized test score:

where has 15 degrees of freedom

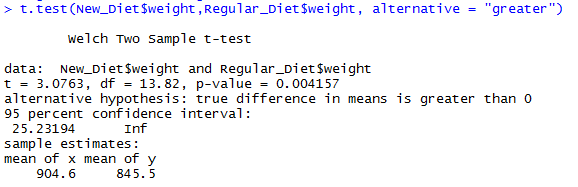
The CI for the diet test is a one tailed test therefore thus the Upper Confidence Level (UCL) will be .

59.1(1.7531)(19.21)= 33.68

Thus LCL = 25.42 and UCL =

H1 falls within the CI while H0 does not, verifying our alternative hypothesis.

**10) Verify the Results Using the R Output**



The R results show the t value is 3.0763 and p-value is 0.004157. Since the p-value is numerically lower than the significance level of 0.05, we reject H0 and conclude that the new diet confers an advantage when the goal is putting weight on cows compared to the regular diet.

R input appendix

