

# TMATH 390 R Lab 9

## Lab 9: 2-sample CI and Inference in R

For this lab we will use the data you obtained in HW 1 and used in previous labs (2 and 3).

**C1.** (4) Submit your R script for this lab.

**C2** (2) For this lab you will select ONE quantitative variable and compare it between TWO of the levels of your qualitative variable. Describe your quantitative variable, your qualitative variable, and the two levels of your qualitative variable. Use the results of the past lab to guide which two levels of your qualitative variable that you choose. These should be the SAME as that you chose in Lab 8

**C3** (2) Calculate a 95% confidence interval for the **difference** in population pulse rates for each group. Use the code below to determine the Welch's df for your confidence interval. Report the df and the confidence interval.

```
# Copy and paste the function lines into the R console and execute  
# This creates your own function to calculate Welch's corrected df.  
welch.fn=function(s1,s2,n1,n2)  
{  
  return(floor(((s1^2/n1+s2^2/n2)^2)/((s1^2/n1)^2/(n1-1)+(s2^2/n2)^2/(n2-1))))  
}  
# Next you would assign the object s1 the value for the  
# sample standard deviation for your first sample,  
# s2 the value for the sample standard deviation for your  
# second sample, and n1 and n2 the sample sizes for your first  
# and second sample.  
# And here is how you run the function:  
welch.fn(s1,s2,n1,n2)
```

### INFERENCE

**C4** (3) You want to test whether the population mean of your quantitative variable differs between the two levels of your qualitative variable. Write down the null and alternative hypotheses, name the test statistic you will use, and the main assumptions of the test statistic.

We can use R to perform our t-test. We will conduct the t-test first assuming equal population variances, then without that assumption. Have a look at the R help file for the function t.test.

```
?t.test
```

In the t-test function, you can do a 1-sample t-test for x, or a 2-sample t-test to compare the population mean of x to the population mean for y. Note the var.equal argument where you can specify whether the equal variances assumption is met.

**C5** (2) Conduct the t-test. Copy and paste the results (be careful, are you assuming equal variances or not?).

**C6** (3) Describe any possible limitations there are to making inferences using these data. Consider how the data were obtained (by you, and by the researchers) and any other qualities of the data you find noteworthy.

**C7** (4) Use full sentences to interpret the results of your analysis. What did the hypothesis tests teach us about your quantitative variable? To what population do you believe these results can be extrapolated?