Due by start of class 4/28/2016. Please email to martin.liermann@noaa.gov

Assessing teaching approaches

A study will evaluate the effectiveness of a new teaching approach. A random sample of schools will be chosen and half randomly chosen to implement the new program. The performance of the new approach will be compared to the traditional teaching methods using a specially designed student evaluation which will be averaged to the school level (so one score per school).

You will help the researchers determine how many schools should be included in the study and then analyze and interpret the results from the full study.

Based on previous work the researchers expect the average score of the new program to be about 1 point higher than the traditional teaching approach. The researchers have provided you with student evaluation results for 10 schools using the traditional teaching approach.

pilotDat <- c(2.78, 3.81, 4.99, 3.96, 3.81, 6.27, 3.08, 6.44, 2.97, 3.53)

The researchers would like to reject (i.e. \( p \leq 0.05 \)) 80% of the time when the true difference is 1. Advise them on an appropriate sample size based on simulations. Assume they will use the two sample t-test and the standard deviation for the two groups is the same (hint: to calculate the standard deviation for a group of data in R use the function sd).

Now assume they collect the data with appropriate sample size (what you told them). Simulate a single data set assuming a difference of 1 and using the sample size you gave them. Before you apply the t-test to the results, state the probability that you will reject the null hypothesis (this should not require any additional calculations). Test to see if you reject the null. Also create a confidence interval around the point estimate (of the difference) using the equation from class. Describe your conclusions (pretending that you don’t know how the data was simulated).