Discussion 7

1. Specifications for a water pipe call for a mean breaking strength μ of more than 2000 lb per linear foot. Engineers will perform a test to decide whether or not to use a certain kind of pipe. A random sample of 1 ft sections of pipe is selected and their breaking strengths are measured. The pipe will not be used unless the engineers can conclude (statistically, not with certainty) that the mean breaking strength is greater than 2000.

   a. Specify appropriate null and alternative hypotheses for this situation.

   b. Based on last week's analsysis, the engineers chose to obtain a sample of 75 random 1 foot pipe sections. The data is provided in a .csv file. Perform a one sample t-test at the 5% level after checking that the assumptions for testing are well met and interpret the results in context.

   c. Another scientist in the lab suggests instead of a t test, a z test could be performed. Explain why either a t or z test will give very similar conclusions in this case.

2. A crop scientist evaluating lettuce yields plants 20 plots, treats them with a new fertilizer, lets the lettuce grow, and then measures yield in numbers of heads per plot. The results are provided in a .csv file.
   The old fertilizer led to an average yield of 145 heads per plot. Test whether the new fertilizer leads to an improved yield via the following steps.

   a. Perform a bootstrap test at a 0.1 significance level. State all assumptions needed.

   b. Find a 90% bootstrap confidence interval.

   c. Perform a t-test and find a corresponding confidence interval using $\alpha = 0.1$. State all assumptions needed, and whether or not you find them reasonable. Compare to results from b and c.