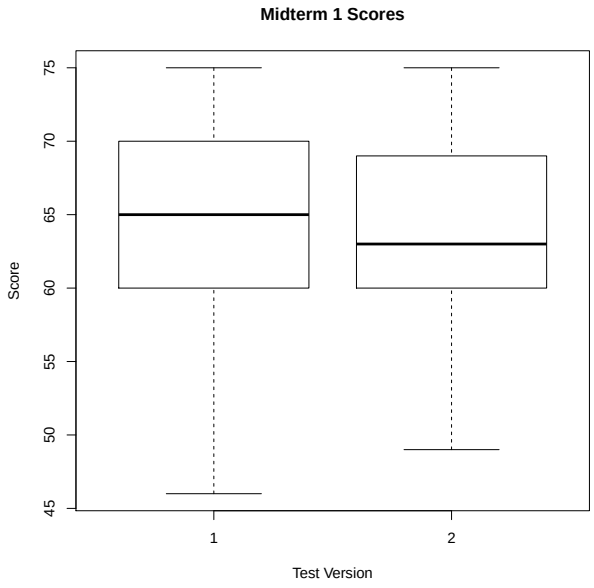
Comparing Two Populations

1. Here are boxplots of the scores from midterm 1 for the two versions of the test (outliers have been removed). Is there evidence that one test was harder than the other?



For the first version, 37 students took the test; the mean score was 64.4 and the standard deviation was 7.0. For the second version, 38 students took the test; the mean score was 63.9 and the standard deviation was 6.8.

What does it mean for one test to be harder than another? Be as precise as possible.

2. This is a continuation of the previous problem (testing whether or not one test was harder than another). Suppose you want to perform a hypothesis test at level 5%.

   (a) What are the populations?

   (b) What are the null and alternative hypotheses?

   (c) What are the samples?

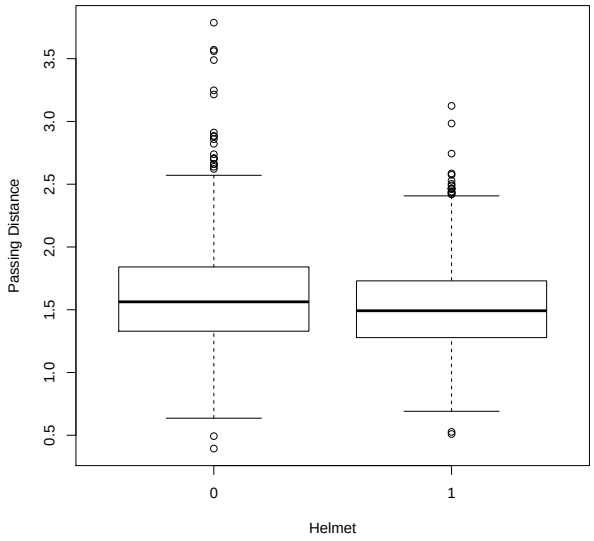
   (d) What is the test statistic?

   (e) What is the rejection region?

   (f) What is the result of the test?

   (g) Approximately what is the p-value?

3. Here are boxplots of the passing distances (in meters) for a bike rider with and without a helmet. Is there evidence that the passing distance differs when the rider has a helmet?



Here are the sample statistics for the passing distance without a helmet: $n_1 = 1206$, $\bar{x}_1 = 1.61$, $s_1 = 0.405$. Here are the sample Here are the sample statistics for the passing distance with a helmet: $n_2 = 1149$, $\bar{x}_2 = 1.52$, $s_2 = 0.354$.

Formulate the problem as a hypothesis test, using significance level 5%.

(a) What are the populations?

(b) What are the null and alternative hypotheses?

(c) What are the samples?

(d) What is the test statistic?

(e) What is the rejection region?

(f) What is the result of the test?

Confidence Intervals

4. Find a 95% confidence interval for the difference in mean score between the two midterm versions.

5. Find a 95% confidence interval for the difference in passing difference with and without a helmet. *Hint:* $\bar{x}_1 - \bar{x}_2 = 0.09$ *and* $SE(\bar{x}_1 - \bar{x}_2) = 0.016$.