[This is ok. Some of the formatting is awkward. However, there is no conclusion to the project - section IV of the inference toolbox is not enough for a conclusion to the project.]

Bullfrogs and Energy Drinks

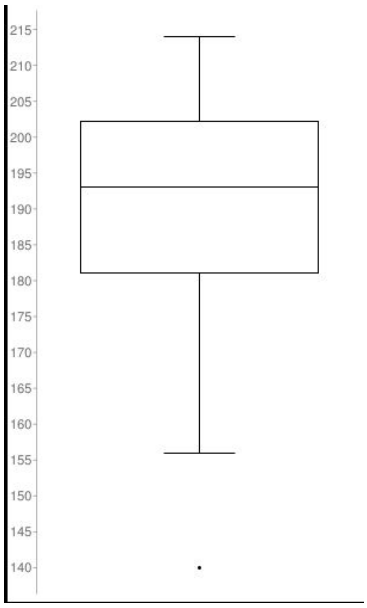
We wish to test whether or not a bullfrog that has been living in a habitat with caffeinated energy drink (experimental group) rather than water will jump further than one living in a normal, water based environment (control group) after one month. To conduct our experiment we caught 60 bullfrogs from a local creek until the quota was filled. The purpose of this is too see whether or not caffeine can be absorbed through pores or must only be drinken.

Once the frogs were taken back to the lab they were divided into two habitats (one with water, the other with energy drink- other than this the environments were identical). To assign the frogs to a habitat they were each assigned an exclusive two digit number from 01 to 60. Using a random digits table we went through two digits at a time and when a number within our range occured, that frog was placed in the experimental group until 30 frogs were placed in the group. The remaining 30 frogs were put in the control group with the water environment.

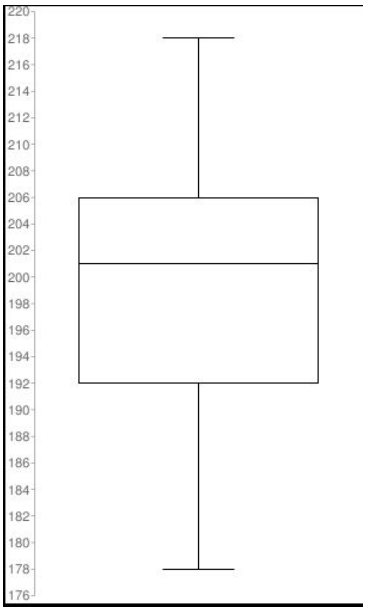
After one month of living in their environments each frogs jump length was recorded. The data is shown below. Three frogs in the experimental group passed away within the month.

JUMP LENGTHS CONTROL GROUP (in cm): 213cm, 208cm, 167cm, 182cm, 204cm, 196cm, 212cm, 140cm, 178cm, 190cm, 199cm, 202cm, 192cm, 194cm, 203cm, 186cm, 198cm, 172cm, 194cm, 203cm, 214cm, 186cm, 167cm, 192cm, 186cm, 167cm, 156cm, 189cm, 202cm, 200cm

JUMP LENGTHS EXPERIMENTAL GROUP (in cm): 212cm, 204cm, 198cm, 186cm, 202cm, 190cm, 198cm, 203cm, 206cm, 218cm, 195cm, 198cm, 201cm, 207cm, 201cm, 189cm, 187cm, 206cm, 209cm, 194cm, 190cm, 178cm, 192cm, 209cm, 204cm, 199cm, 210cm



Box Plot of Control Group in CM



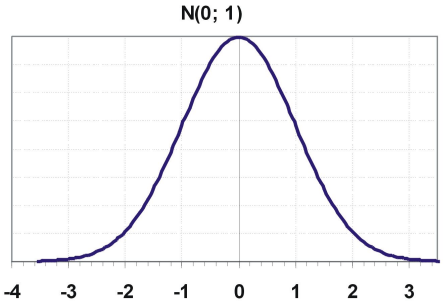
Box Plot of Experimental Group in CM

The population of interest is Bullfrogs from a local creek. The parameter we wish to make a claim about is the true mean difference in jumping length of Bullfrogs living in energy drink rather than water (d-w).

$$Ho : \mu_W = \mu_D$$

$$H_a : \mu_W < \mu_D$$

Since we wish to make a claim about the difference in two means and don't have σ we will conduct a two-sample-T-test. We have a simple random sample so our data should generalize to the population of interest. The creek has a Bullfrog overpopulation problem so there are more than 10(30) female and male Bullfrogs so our sampling is independent. The sample size of the control group is large (greater than or equal to thirty) so our data is normal. The sample size of the experimental group on the other hand is medium (greater than fifteen, less than thirty) due to the three casualties, (whether or not the frogs died due to the caffeinated beverage is unknown) but by taking a look at the boxplot above, our data has no strong skewness or outliers so by the CLT the sampling distribution of the difference in sample means is approximately normal and our calculations will be accurate.



With such a small p-value, the shaded region is off to the left of the normal curve

The data from the calculated 2-SampTTest is shown below:

t=-2.6693
p=.00527
df=44.8242
Mean of Control Group=189.7333cm
Mean of Experimental Group= 199.4815

If the environment the frogs lived in did not make a difference in mean jump length, we'd get results this different than expected 0.527% of the time by chance variation alone. Using an alpha value of $\alpha = .05$ we will reject the null hypothesis in favor of the alternative hypothesis. We have convincing evidence that the true mean jump length of Bullfrogs living in a caffeinated environment is greater than that of Bullfrogs living in a water environment.