MTH 316 NONPARAMETRIC STATISTICS
Homework #4 (Due Thursday, September 26)

The following exercises are from Chapter 3, pages 79–82.

1. Problem 3.10
2. Problem 3.16
3. Problem 3.17
4. Problem 3.19
5. Problem 3.20

6. Install the package Lock5Data from CRAN. For instance, using the R point-and-click interface, try Tools → Install Packages... Load the dataset BodyTemp50 from the Lock5Data package. This is a dataset of 50 healthy adults. Unfortunately the documentation doesn't give how the data was collected, but for this problem we will assume that it is a representative sample of healthy US adults. Consider using the following lines of R code.

```
> data( BodyTemp50, package='Lock5Data' )
> str(BodyTemp50)
> BodyTemp50$Pulse
```

One of the columns of this dataset is the Pulse of the 50 data points, which is the number of heartbeats per minute.

a. Create a histogram of the observed pulse values. Comment on the graph and aspects of the graph that might be of scientific interest.
b. Calculate the sample mean $\overline{x}$ and sample standard deviation s of the pulses.
c. Create a dataset of 10000 bootstrap replicates of $\overline{x}^*$.
d. Create a histogram of the bootstrap replicates. Calculate the mean and standard deviation of this distribution. Notice that the standard deviation of the distribution is often called the Standard Error of $\overline{x}^*$ and we'll denote it as $\widehat{\sigma}_{\overline{x}^*}$.
e. Using the bootstrap replicates, create a 95% confidence interval for μ, the average adult heart rate.
f. Calculate the interval $(\overline{x} - 2\widehat{\sigma}_{\overline{x}^*}, \overline{x} + 2\widehat{\sigma}_{\overline{x}^*})$ and comment on its similarity to the interval you calculated in part **e.**