Homework 8

Write a `.Rmd` file to answer these questions, knitting it to `.html` along the way. Start by pasting this outline to help the grader find your answers:

```
(Your Name Here)

## 1 Pumpkins

## 1a.

## 1b.

## 1c.

## 1d.

## 1e.

## 1f.

## 2. Penguins

## 2a.

## 2b.

## 2c.

## 2d.
```

1. A pumpkin farmer weighed a simple random sample of size $n = 20$ pumpkins, with these results:

   9.6, 8.8, 5.1, 9.7, 9.1, 8.9, 8, 9.2, 2.7, 9.1, 8.5, 7.3, 9.3, 9.6, 4.1, 9.9, 7.6, 9, 7.2, 8.5

   (a) Create a QQ plot of the weights. Do you think it is reasonable to assume that the population distribution is normal? Explain your answer.

   (b) Regardless of your answer to (a), use R to perform the bootstrap with 2000 resamplings to create a 90% confidence interval for μ. (Show your R code and its output.)

   (c) Suppose you want to know whether the true mean pumpkin weight for this pumpkin farmer's patch is greater than 7.2. Conduct a bootstrap hypothesis test with 2000 resamplings at a significance level $\alpha = 0.05$.

      i. What is the p-value?

      ii. What conclusion do you draw?

   (d) Conduct a hypothesis test at level $\alpha = 0.05$ to see whether we can assert the data are strong evidence the true *median* weight for this pumpkin farmer's patch is greater than 7.2.

   What is the value of the test statistic?

   (e) What is the p-value?

(f) What is your conclusion?

2. Most penguin species are not sexually dimorphic, which means they lack obvious outward body characteristics which indicate sex. Observation of behavior or a blood test can determine Penguin sex. A penguin researcher is interested in estimating the proportion of females in a large penguin population. She takes a random sample of $n = 20$ penguins and determines the sex of each one using a blood test. She finds 12 males and 8 females. Let π be the proportion of females in the population.

   (a) Find a point estimate of π.

   (b) Find the estimated standard deviation of your estimate.

   (c) Is it reasonable to compute a 95% confidence interval for π using the normal approximation in this case? If it is possible, explain why, and make the interval. If it is not reasonable, explain why.

   (d) Are the data strong evidence the population proportion of females is different from 63%? Run a test at level $\alpha = .05$ to find out.