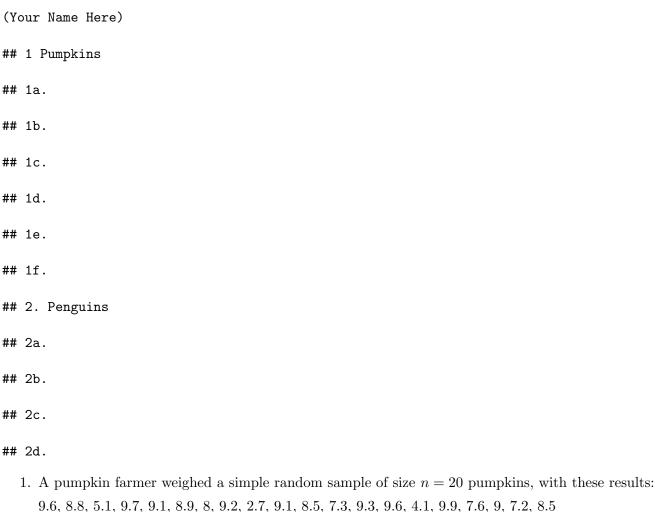
## Homework 8

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:



- - (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  $\mu$ . (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  $\pi$  be the proportion of females in the population.
  - (a) Find a point estimate of  $\pi$ .
  - (b) Find the estimated standard deviation of your estimate.
  - (c) Is it reasonable to compute a 95% confidence interval for  $\pi$  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.