t-test

1. Recall the sample of Boston cream donut weights $X_1, \ldots, X_4$ which are assumed to be iid $N(\mu, \sigma^2)$ with unknown μ and unknown σ^2. We previously found a 95% confidence interval for the true average weight μ of these donuts to be $[105.32, 115.18]$. Consider the hypotheses:

$$H_0 : \mu = 100 \qquad \text{vs.} \qquad H_1 : \mu \neq 100$$

We observed in this sample of $n = 4$ donuts a sample mean $\bar{X} \approx 110$ and sample standard deviation $s \approx 3$. We want to perform a level-0.05 t-test of these hypotheses.

   (a) What is the exact form of the rejection rule? Write this both exactly and then write the corresponding R code you would use to evaluate.

   (b) What is the p-value for the observed data?

   (c) What is your decision regarding the hypotheses, and why? You should be able to justify your decision in two ways! *You'll need to evaluate the R code to answer this question.*