Homework 4-Due: Friday 3/16, 5pm

1. Marcello the monkey is doing some calculations with his banana hoard. He has 200 bananas, which have a *total* weight of 25 kilograms. Assume the weight of a banana can be represented as a random variable with mean μ and standard deviation σ. Marcello remembers from his freshman course in bananology that σ is equal to 10 grams.

   a. Construct a 95% confidence interval for μ, the average weight of an individual banana.

   b. Being a precision oriented monkey, Marcello would like to know μ to within a margin of 0.1 grams with 99% certainty. How many bananas would he need in order to accomplish this?

   c. Marcello's banana pudding calls for three bananas and an amount of custard whose weight is exactly equal to that of the bananas. What is the standard deviation of the weight of a recipe of banana pudding?

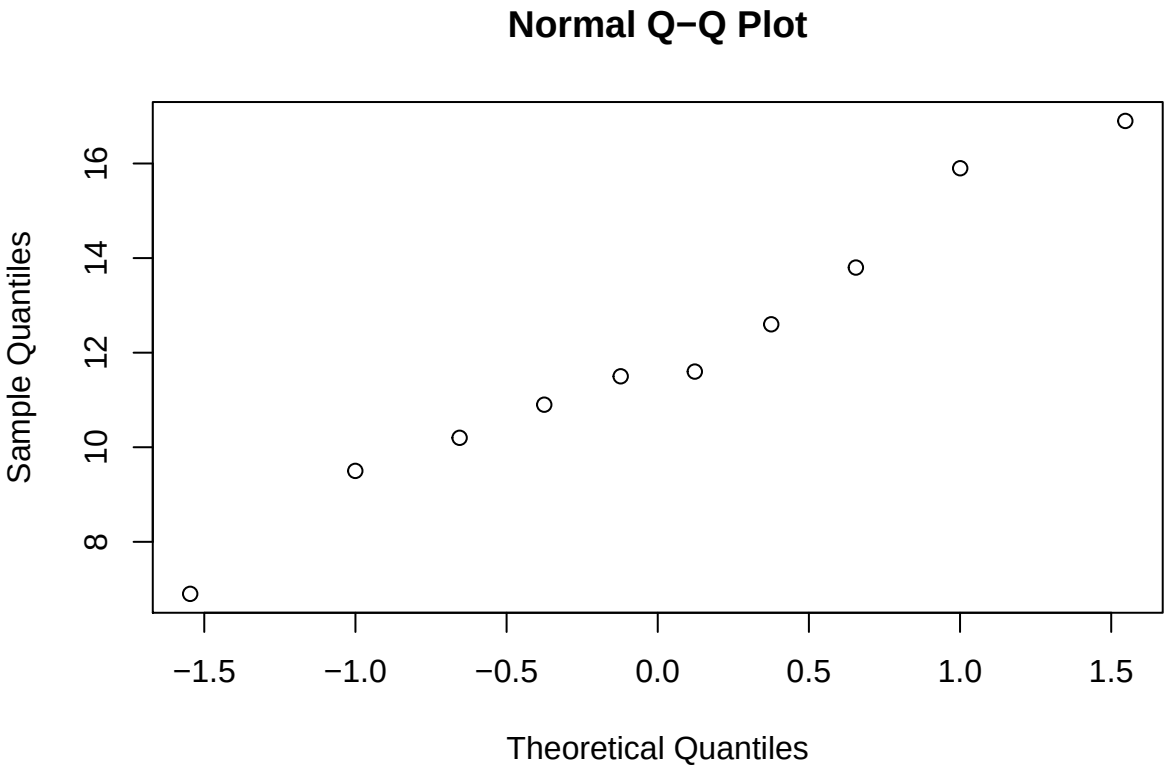
2. A researcher is studying the size of leafcutter ant colonies in a certain region. She measures the radius, in meters, of ten different mounds. Here are her measurements:
   10.9, 15.9, 11.6, 9.5, 13.8, 11.5, 12.6, 16.9, 6.9, 10.2

   a. Calculate the sample mean for these values.

   b. Calculate the sample standard deviation for these values.

   c. Construct a 95% confidence interval for leafcutter mound radius.

   d. The following is a qqplot of the data. Do you think the assumptions we used to build our confidence interval are appropriate?



3. Suppose that, in a sample of 600 individuals, 48 have allergic reactions to pollen. Construct a 90% confidence interval for the proportion of individuals from the population who have an allergic reaction to pollen.