Week 6 Friday

Make sure you know your neighbors' names. Then discuss:

The average birthweight of full-term newborn babies is known to be roughly normal with mean 7.5 lbs and standard deviation 0.7 lbs.

If 1000 researchers go out, collect simple random samples of birthweights of full-term newborns, and construct 90% confidence intervals for mean birthweight using their data, how many of them do you expect will find that 7.5 lbs is *not* contained in their confidence interval?

Confidence intervals for means

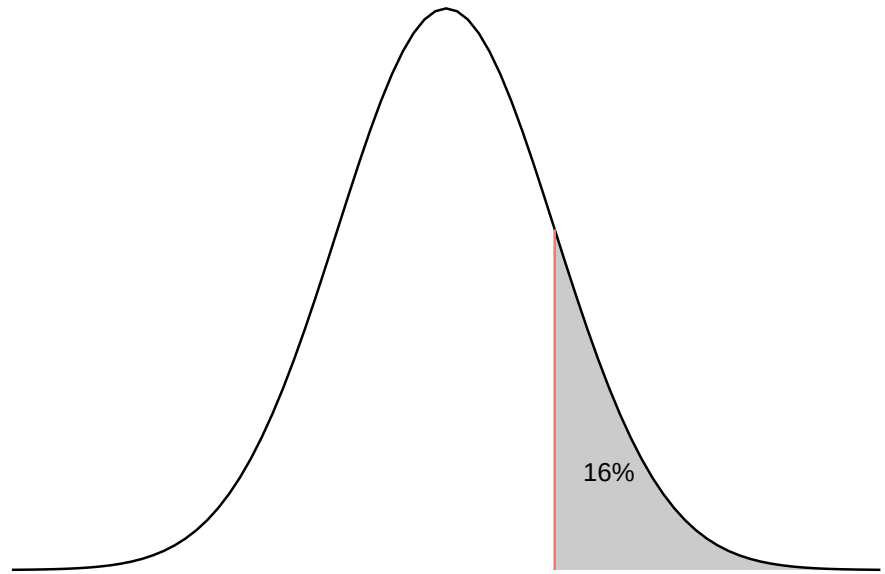
1. Suppose `pt(-, df)` is a function that takes as input an observation in a t-distribution with degrees of freedom `df` and outputs its percentile, and `qt(-, df)` is a function that takes as input a percentile and outputs the observation in a t-distribution with degrees of freedom `df` that is at that percentile.
A t-distribution with 25 degrees of freedom is depicted below.
Which of the following would you use to calculate the x-coordinate of the pink line?

(A) `pt(0.16, 25)`

(B) `1-pt(0.16, 25)`

(C) `qt(0.16, 25)`

(D) None of the above.



2. Suppose `pt(-, df)` is a function that takes as input an observation in a t-distribution with degrees of freedom `df` and outputs its percentile, and `qt(-, df)` is a function that takes as input a percentile and outputs the observation in a t-distribution with degrees of freedom `df` that is at that percentile.
Which of the following would you use to find the critical value for a 80% confidence interval for a mean based on a simple random sample of size 20?

(A) `pt(0.8, 20)`

(B) `qt(0.8, 20)`

(C) `pt(0.8, 19)`

(D) None of the above

3. Suppose that researchers interested in lead exposure due to car exhaust tested blood lead concentration in a simple random sample of 25 traffic controllers. The sample data was roughly normal with an average lead concentration of 120 g/L and a standard deviation of 30 g/L. A previous study of individuals with no significant history of exposure to car exhaust found an average blood lead concentration of 35 g/L.

(a) Calculate and interpret a 95% confidence interval for the average blood lead concentration for traffic controllers.

(b) Based on this data, what are your thoughts about the hypothesis that the average blood lead concentration of traffic controllers matches that of individuals with no significant history of exposure to car exhaust?

4. The standard deviation of SAT scores for students at a particular university is 250 points. Two statistics students, Raina and Luke, want to estimate the average SAT score of students at this university. They both want their margin of error to be no more than 25 points.
Raina wants to use a 90% confidence interval. Luke wants to use a 95% confidence interval. Who'll need to collect a larger sample?

(A) Raina

(B) Luke

(C) Both need to collect samples of equal size

5. The standard deviation of SAT scores for students at a particular university is 250 points. Raina is a statistics student at this university who wants to estimate the average SAT score using a 90% confidence interval. She wants her margin of error to be no more than 25 points. How large a sample does she need to collect?