# Lab 9 – t-statistic practice

**Due Monday, April 7 at beginning of class**

**Problem 1 (Multiple Hypotheses)** You are measuring the thickness of books in millimeters and you find that in a sample of $n = 15$ you have $\overline{x} = 25$ and $\hat{\sigma} = 3$. There are two competing hypotheses for the true thickness, $H_{0_1} : \mu = 22$ and $H_{0_2} : \mu = 26.5$

- Find a t-statistic associated with each hypothesis
- Using your worksheet, find the critical values associated with 80%, 90%, and 95% confidence
- At what confidence levels would you reject $H_{0_1}$? How about $H_{0_2}$?
- Against which hypothesis do we have more evidence against?

**Problem 2 (Multiple Samples)** We are interested in determining the *proportion* of countries in which the average life expectancy is greater than 70 years. To this end, we collected two different samples:

- **Sample 1:** 11 countries had life expectancy greater than 70, 14 did not
- **Sample 2:** 14 countries had life expectancy greater than 70, 16 did not

We hypothesize that the true proportion of countries with LE greater than 70 is $p_0 = 0.65$. Use this information to answer the following

- Find the $t$-statistic associated with each of these samples
- Why can we not compare the $t$-statistics directly in this case to determine which sample provides more evidence against the null? Do the $t$ statistics from each sample follow the same distribution?
- Determine for each sample at which confidence level from the critical value sheet in which we would reject $H_0$. Based on this, which sample provides more evidence against the null hypothesis?