Stat 252 Winter 2016
Assignment #1

This assignment is due at the beginning of class on Wednesday, January 13, 2016. Your solutions will be graded based on both correctness *and* exposition. In particular, neatness and grammar count. You must write out solutions using full sentences (including capital letters to start sentences and periods to end them) and no abbreviations. That is, symbols such as $\therefore$ and $\Rightarrow$ are forbidden; write out the full words *therefore* and *implies* in their place.

As it is unlikely that you have ever been required to pay attention to your written mathematics, this assignment will be brief and will only include review material. In fact, the following three problems were recently assigned in Stat 160; however, you will probably need to review your Stat 160 material in order to answer them.

1. * It is known that the size of an adult male's foot is a normally distributed variable with mean 25 cm and population standard deviation 3 cm.

(a) Calculate the probability that a randomly selected adult male's foot measures between 22 and 28 cm. (Round your answer to 3 decimal places.)

(b) Calculate the probability that the average foot length for a random sample of 100 adult males measures between 24.7 and 25.3 cm. (Round your answer to 3 decimal places.)

2. * *Bright Idea Lighting* tests their light bulbs, and finds that they have a mean lifetime of 262 hours, with a standard deviation of 41 hours. They test a sample of light bulbs from their rival, *The Electric Company*, and discover that they last 340, 190, 150, 280, 250, 180, 380, 300, 250, and 230 hours, respectively.

(a) Find the sample median, sample mean, and sample standard deviation of the lifetime of *The Electric Company's* light bulbs.

(b) Assuming the distribution of bulb lifetime of both companies follows a normal distribution, how likely is each company to produce a light bulb that lasts 350 hours?

(c) Compute an approximate 95% confidence interval for the true mean lifetime of *The Electric Company's* light bulbs based on this sample of data. (*Hint*: Since the true variance of *The Electric Company's* light bulbs' lifetimes is unknown, use a t-based confidence interval.)

(d) Is there evidence to conclude at the $\alpha = 0.05$ significance level that *Bright Idea Lighting* light bulbs have a different mean lifetime than those of *The Electric Company*?

3. * *Cheap-O-Lube* wants to estimate how much the average time customers have to wait for an oil change has changed over the year. Last year, a sample of 200 customers produced a mean waiting time of 4.5 minutes with a standard deviation of 1 minute. This year a sample of 180 customers produced a mean waiting time of 3.5 minutes with a standard deviation of 1 minute. By conducting an appropriate hypothesis test, determine whether or not there is significant evidence at the $\alpha = 0.05$ level that *Cheap-O-Lube* customers are waiting less this year when compared to last year.