

Provide the requested tables, charts, and statistics and answer each question fully.

The purpose of this section is to create a small *distribution of means* so that you can treat a series of means as a sample. Taking standard error is S of the sampling distribution of the sample means, this exercise should show you that.

- 1) Collect height data for each person in the room (= your population for this exercise), and give each person a numerical label after the number on the note-card they received last week in class. Set up your sampling frame.

- a. What is the population mean height?

- b. What is the population standard deviation? $\sigma_x = \sqrt{\frac{\sum (X - \mu)^2}{N}}$

Population level data, which you rarely have

- 2) Draw 5 random samples of $n = 10$ from your sampling frame using simple random sampling (label samples from 1 to 5) and the starting point given in class and calculate a mean and a standard deviation for each sample. *List in a table the sample means and standard deviations.*

- 3) What is the standard deviation of your sampling distribution of means?

- a. What is this statistic called?
 - b. How can it be estimated?
 - c. Why would we estimate it instead of drawing multiple samples and creating a sampling distribution of the means for every study?

So here you are creating a "mini" distribution of sample means so that you can compare estimates of standard error to the S of the means

- 4) Look at the definition of "sampling distribution of the sample means" from your reading handout and lecture.

- a. Is your distribution of means *truly* such a distribution? Why or why not?

Purpose of this section is to see the effects of sample size on error, t-scores, and CI. Also to see that CI changes when you use σ instead of S in the standard error.

- 5) Draw three new random samples ($n = 5, 15, 30$) using the starting point on the random number table given to you in class (*you must change sample size to look at its effect on CI*).

- a. Calculate \bar{X} and S for each sample
 - b. Estimate S_E based on each sample
 - c. Determine df for each sample

This section is all about CI. You should use the t distribution because you have very small samples. See how CI changes w/ n .

- 6) Calculate CI of 70%, 80%, and 95% for each \bar{X} using the sample standard error S_E from no. 5.
- 7) Use σ from no. 1 for the population to calculate the population-based standard error
- 8) Calculate the same confidence intervals for each sample mean using the population-based standard error from no. 7.
- 9) What does an increase in sample size do to your CIs? What does using the population standard error instead of S_E do to your CIs? Why?