

AP Statistics

Chapter 10: Comparing Two Populations

Day 4

HW: Lesson 4 Practice Worksheet

ONLY DO QUESTION #1

Confidence Intervals for Two-Samples

Standard Deviation:

$$\sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

Confidence Interval:

$$CI = (\bar{x}_1 - \bar{x}_2) \pm t * \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

Wade Tract Preserve

The Wade Tract Preserve in Georgia is an old-growth forest of long-leaf pines that has survived in a relatively undisturbed state for hundreds of years. One question of interest to foresters who study the area is "How do the sizes of longleaf pine trees in the northern and southern halves of the forest compare?" To find out, researchers took random samples of 30 trees from each half and measured the diameter at breast height (DBH) in centimeters. Summary statistics from Minitab are shown below.

Descriptive Statistics: North, South				
Variable	n	Mean	StDev	Minimum
North	30	23.70	17.50	10.00
South	30	14.50	14.24	10.00

① As stated, these are SRS's.

② We can assume there are at least 300 trees in the north and south.

③ Since $n \geq 30$, we can assume the data is approx. normal.

Wade Tract Preserve

Construct a 90% Confidence Interval.

* On my calculator, I performed 2-sample T-interval.

df = 29

Descriptive Statistics: North, South				
Variable	n	Mean	StDev	Minimum
North	30	23.70	17.50	10.00
South	30	14.50	14.24	10.00

μ_1 = The average length of a longleaf pine tree in the north.

μ_2 = The average length of a longleaf pine tree in the south.

We are 90% confident that the true difference in the mean length of a longleaf pine tree in the north and south falls between -17.72 and -3.936 cm. This suggests that the average length of a longleaf pine tree in the north is less than the south.

Plastic Grocery Bags

Do plastic bags from Target or plastic bags from Bashas hold more weight? A group of AP Statistic students decided to investigate by filling a random sample of 5 bags from each store with common grocery items until the bags ripped. Then they weighed the contents of items in each bag to determine its capacity. Here are their results, in grams:

Target:	12,572	13,999	11,215	15,447	10,896
Bashas:	9552	10,896	6983	8767	9972

Construct and interpret a 99% confidence interval for the difference in mean capacity of plastic grocery bags from Target and Bashas. Does your interval provide convincing evidence that there is a difference in the mean capacity among the two stores?

Plastic Grocery Bags

Target:	12,572	13,999	11,215	15,447	10,896
Bashas:	9552	10,896	6983	8767	9972

$(-100.9, 7284.5)$

We are 99% confident that the true difference in the mean weight a bag can hold from Target and Bashas falls between -100.9 and 7284.5 grams. This suggests that target bags hold more weight than Bashas.

The Conditions for $\bar{x}_1 - \bar{x}_2$

- Must be an SRS.
- 10% condition must be met.
- Assume the data is approximately normal if $n \geq 30$. If not, graph the data and look for skewness and outliers.