## Section 12 - Topic 9

## Comparing Treatments - Part 1

A candle company introduced a new type of wax into their candles. They claim their candles burn longer than the leading brand. The burn times of ten candles (five from each brand), rounded to the nearest hundredth of an hour, are shown below. The candles are the same height and width. They were burned in the same conditions.

## $12.25,11.89,12.14,11.96,12.02,11.56,12.21,11.69,12.15,11.92$

For now, we will randomly divide the candles into two groups using a random number generator and not pay attention to the brand.

| Group A | 12.15 | 12.21 | 12.02 | 11.69 | 12.14 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Group B | 11.56 | 12.25 | 11.92 | 11.89 | 11.96 |

## Let's Practice!

1. Consider Group A and Group B.
a. Calculate the mean for Group A and Group B.
b. Calculate the difference between the means: $\left(\bar{x}_{A}-\bar{x}_{B}\right)$.
c. Interpret the difference value in the context.

## Try It!

2. The burn times were randomized three more times. The means and difference values (Diff) were calculated. Interpret the following difference values.
a. 0.35
b. -0.21
3. What would a difference value of 0 or very near 0 mean?

We must consider that the observed differences in the means could be from chance or they could be statistically $\qquad$ -.

We only looked at one randomization. Imagine that we randomized them and completed 249 more simulations.

The dot plot below represents the distribution of the difference values from the 250 simulations.


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## Let's Practice!

4. Determine if the following difference values are statistically significant.
a. 0.13
b. -0.24

## Try It!

5. Determine if the following difference values are statistically significant.
a. 0.22
b. -0.18

Let's recap: There are three things to help us determine if the difference value is statistically significant.
> The difference value is relatively far from $\qquad$ $\ldots$.
> For positive differences, the percentage of observed values that fall at or above the difference value is very
$\qquad$ —.
> For negative differences, the percentage of observed values that fall at or $\qquad$ the difference value is very small.

