

Math 247: Hypothesis Testing for One Mean (Section 9.4)

Four Step Process

Step 1: _____

State hypotheses using math symbol. Then describe what those symbols are saying, in words.

$$H_0 : \mu = \mu_0$$

$$H_a : \mu < \mu_0 \quad (\text{Left-Tailed Test}) \quad \text{or} \quad \mu > \mu_0 \quad (\text{Right-Tailed Test}) \quad \text{or} \quad \mu \neq \mu_0 \quad (\text{Two-Tailed Test})$$

Step 2: _____

Choose and state which test you're using and choose the Significance Level, α (alpha)

Check Conditions (make assumptions) FOR THAT TEST!

For the t-Test for One Mean, we have to meet these conditions:

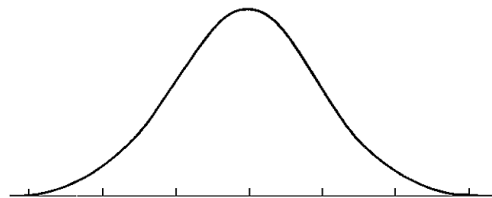
1. **Random** Sample and **Independent** Observations?
2. **Sample Size/Population Shape?** What to check:
Either the sample is large ($n \geq 25$)
or, if sample is small ($n < 25$), the **population** must be approximately **normal**.
3. **Large Population?** Target population is at least 10 times the sample size.

Step 3: _____

Find the Test Statistic by hand, but then we'll use StatCrunch to find the P-value. Be able to illustrate all of this on a t-distribution curve.

$$t = \frac{\bar{x} - \mu}{SE}$$
$$df = n - 1$$

$$SE = \frac{s}{\sqrt{n}}$$



Step 4: _____

Include both of the following:

- (a) Compare the p-value to the level of significance and state whether you will reject or not reject the null hypothesis
- (b) Interpret the result in the context of the problem. Your interpretation should include whether or not your result is statistically significant.

Example: Nutrition (again). Kale is a type of cabbage commonly found in salad and used in cooking in many parts of the world. Measurements were made of the calcium content (in mg) of kale (200 grams of chopped, boiled kale) with the following results:

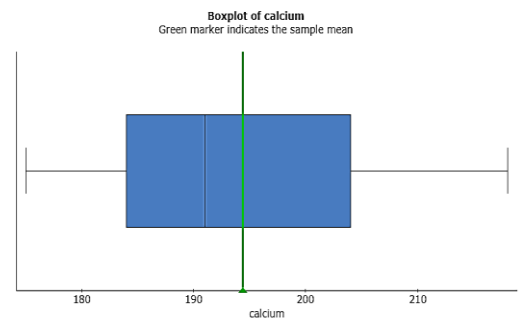
175mg 184mg 204mg 191mg 218mg (outlier removed)

A nutrition website claims that that, on average, kale has a calcium content of 175 mg per 200 gram serving. Test to see whether the calcium content of kale is more than the website claims. **Use a significance level of .05.** Use StatCrunch to find the P-value but illustrate the StatCrunch results on a t-distribution curve.

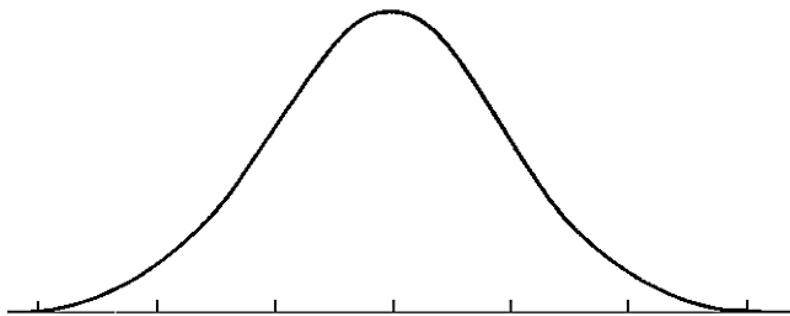
1.

This is a _____ - Tailed Test

2.



3.



Hypothesis test results:

Variable	Sample Mean	Std. Err.	DF	T-Stat	P-value
calcium	194.4	7.5670338	4	2.5637523	0.0312

4.

5. The 95% CI for calcium in a serving of kale was (173.4, 215.4) mg.

So, is it possible the website gave the correct value (average calcium content of a serving of kale is 175mg)?

But the hypothesis test led us to conclude what about the average calcium content of kale?

Why is there a discrepancy in these two answers?