

Topic: Test statistics for one- and two-tailed tests

Question: If you're conducting a two-tailed test, what were the signs in the null and alternative hypotheses?

Answer choices:

A $=$ and \neq

B \leq and $>$

C \geq and $<$

D \leq and \geq



Solution: A

When the null and alternative hypotheses use the $=$ and \neq signs, we'll use a two-tailed test.



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Question: Consider the hypothesis, “Reading more about statistics could increase or decrease the reader’s desire to learn about statistics.” What type of test would be used to test this hypothesis?

Answer choices:

- A One-tailed test
- B Two-tailed test
- C Both a one- and two-tailed test
- D Neither a one- or two-tailed test



Solution: B

The hypothesis is non-directional because the hypothesis stated that the desire to learn statistics will change after reading more about statistics, but it doesn't say whether that desire will increase or decrease. If we tested this hypothesis statistically, the test would be a two-tailed test, in which the null hypothesis would include an $=$ sign, and the alternative hypothesis would include a \neq sign.



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Question: You've decided to give all of your friends a small box of homemade cookies. You've already baked a variety of cookies and randomly placed them into the boxes for each of your friends. You want to make sure that each box is close to 0.5 pounds. So you take a sample of 10 boxes and find a sample mean of 0.54 pounds, and a sample standard deviation of $s = 0.3$ pounds. Assuming that the weights of all the boxes are normally distributed, calculate the test statistic.

Answer choices:

- A $t \approx -0.42$
- B $t \approx 0.42$
- C $t \approx -0.58$
- D $t \approx 0.58$



Solution: B

Because population standard deviation is unknown (we were only given sample standard deviation), and because we were told that we can assume the population is normally distributed, the test statistic will be

$$t = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

$$t = \frac{0.54 - 0.5}{\frac{0.3}{\sqrt{10}}}$$

$$t = \frac{0.04\sqrt{10}}{0.3}$$

$$t \approx 0.42$$

