

Topic: Inferential statistics and hypotheses

Question: What is the null hypothesis in a test procedure?

Answer choices:

- A The claim for which we're trying to provide support
- B The claim we're trying to reject in order to provide support for the opposite claim
- C A step that we can skip because it's empty
- D The claim that the test characteristic is greater than the hypothesized value



Solution: B

The null hypothesis in a statistical hypothesis test or test procedure is the claim that's assumed to be true. In order to provide statistical support for some claim, we want to show that our data is outside of the null hypothesis. This means the point of the statistical test is to reject the null hypothesis in order to provide support for the opposite claim.

In answer choice A, the claim for which we're trying to provide support is our alternative hypothesis.

In answer choice B, the claim we're trying to reject in order to provide support for the opposite claim (the alternative hypothesis) is the null hypothesis.

Answer choice C is a false statement. We can't skip the step where we write our null and alternative hypotheses, because we need these hypothesis statements in order to know clearly what we're trying to test.

Answer choice D is an example of a possible alternative hypothesis.



Topic: Inferential statistics and hypotheses

Question: Which statement is not a possible alternative hypothesis?

Answer choices:

- A population parameter $>$ hypothesized value
- B population parameter $<$ hypothesized value
- C population parameter \neq hypothesized value
- D population parameter $=$ hypothesized value



Solution: D

The null hypothesis always takes one of the following forms,

H_0 : population parameter = hypothesized value

H_0 : population parameter \geq hypothesized value

H_0 : population parameter \leq hypothesized value

and the associated alternative hypotheses are

H_a : population parameter \neq hypothesized value

H_a : population parameter $<$ hypothesized value

H_a : population parameter $>$ hypothesized value

respectively. Answer choices A, B, and C are all possible alternative hypotheses, which means D is the only answer choice that can't represent an alternative hypothesis.



Topic: Inferential statistics and hypotheses

Question: A researcher thinks that a new drug will decrease the number of people who experience severe symptoms of asthma. Currently, 286 out of every 2,000 asthma patients experience severe symptoms. Which pair of hypothesis statements shows a correct way to set up the hypothesis test?

Answer choices:

- A $H_0 : \mu = 286$ and $H_a : \mu \neq 286$
- B $H_0 : p = 286$ and $H_a : p \neq 286$
- C $H_0 : p = 0.143$ and $H_a : p > 0.143$
- D $H_0 : p \geq 0.143$ and $H_a : p < 0.143$



Solution: D

The proportion of people who experience severe asthma symptoms is

$$p = \frac{x}{N}$$

$$p = \frac{286}{2,000}$$

$$p = 0.143$$

Since the researcher believes that the drug will decrease the proportion of people who experience severe symptoms, his alternative hypothesis will be

$$H_a : p < 0.143$$

which means his null hypothesis is

$$H_0 : p \geq 0.143$$

