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# Writing null and alternative hypothesis worksheet

## Hypotheses

An hypothesis is a specific statement of prediction. It describes in concrete (rather than theoretical) terms what you expect will happen in your study. Not all studies have hypotheses. Sometimes a study is designed to be exploratory (see [inductive research](#)). There is no formal hypothesis, and perhaps the purpose of the study is to explore some area more thoroughly in order to develop some specific hypothesis or prediction that can be tested in future research. A single study may have one or many hypotheses.

Actually, whenever I talk about an hypothesis, I am really thinking simultaneously about *two* hypotheses. Let's say that you predict that there will be a relationship between two variables in your study. The way we would formally set up the hypothesis test is to formulate two hypothesis statements, one that describes your prediction and one that describes all the other possible outcomes with respect to the hypothesized relationship. Your prediction is that variable A and variable B will be related (you don't care whether it's a positive or negative relationship). Then the only other possible outcome would be that variable A and variable B are *not* related. Usually, we call the hypothesis that you support (your prediction) the **alternative hypothesis**, and we call the hypothesis that describes the remaining possible outcomes the **null hypothesis**. Sometimes we use a notation like  $H_0$  or  $H_1$  to represent the alternative hypothesis or your prediction, and  $H_0$  or  $H_1$  to represent the null case. You have to be careful here, though. In some studies, your prediction might very well be that there will be no difference or change. In this case, you are essentially trying to find support for the null hypothesis and you are opposed to the alternative.

If your prediction specifies a direction, and the null therefore is the no difference prediction and the prediction of the opposite direction, we call this a **one-tailed hypothesis**. For instance, let's imagine that you are investigating the effects of a new employee training program and that you believe one of the outcomes will be that there will be *less* employee absenteeism. Your two hypotheses might be stated something like this:

The null hypothesis for this study is:

$H_0$ : As a result of the XYZ company employee training program, there will either be no significant difference in employee absenteeism or there will be a significant *increase*.

which is tested against the alternative hypothesis:

Choose 1 answer:

$H_0: p = 530 \text{ mL}$   
 $H_a: p > 530 \text{ mL}$   
 (where  $p$  is the proportion of liquid dispensed on this setting)

$H_0: p = 530 \text{ mL}$   
 $H_a: p < 530 \text{ mL}$   
 (where  $p$  is the proportion of liquid dispensed on this setting)

$H_0: \mu = 530 \text{ mL}$   
 $H_a: \mu > 530 \text{ mL}$   
 (where  $\mu$  is the average amount of liquid dispensed on this setting)

$H_0: \mu = 530 \text{ mL}$   
 $H_a: \mu < 530 \text{ mL}$   
 (where  $\mu$  is the average amount of liquid dispensed on this setting)

*Handwritten notes:*  
 $H_0$ : 'no difference'  
 $H_a$ :  
 $H_0: \mu = 530 \text{ mL}$   
 $H_a: \mu > 530 \text{ mL}$

Writing null and alternative hypothesis worksheet with answers. Practice writing null and alternative hypothesis worksheet. Writing null and alternative hypothesis worksheet pdf.

However, be aware that many researchers (including one of the co-authors in research work) use  $=$  in the null hypothesis, even with  $>$  or  $<$  as the symbol in the alternative hypothesis.  $H_0: \text{_____}$   $H_a: \text{_____}$  A random survey of 75 death row inmates revealed that the mean length of time on death row is 17.4 years with a standard deviation of 6.3 years. This is your answer to your research question.  $H_0: p = 0.42$   $H_a: p < 0.42$  Suppose that a recent article stated that the mean time spent in jail by a first-time convicted burglar is 2.5 years. There are two options for a decision. They are called the null hypothesis and the alternative hypothesis. The same article stated that 6.6% of U.S. students take advanced placement exams and 4.4% pass. What is the random variable? A sociologist claims the probability that a person picked at random in Times Square in New York City is visiting the area is 0.83.  $H_0: p = 0.40$   $H_a: p = 0.40$   $4.5 H_0: \mu \geq 4.5$ ,  $H_a: \mu < 4.5$   $H_0: \mu = 4.75$ ,  $H_a: \mu > 4.75$   $H_0: \mu = 4.5$ ,  $H_a: \mu > 4.5$  Hypothesis a statement about the value of a population parameter, in case of two hypotheses, the statement assumed to be true is called the null hypothesis (notation  $H_0$ ) and the contradictory statement is called the alternative hypothesis (notation  $H_a$ ). About half of Americans prefer to live away from cities, given the choice.  $H_0$ : No more than 30% of the registered voters in Santa Clara County voted in the primary election. State the null and alternative hypotheses. After you have determined which hypothesis the sample supports, you make a decision. The sample mean was 4.75 hours with a sample standard deviation of 2.0. Conduct a hypothesis test. The mean number of cars a person owns in her lifetime is not more than ten. Since the null and alternative hypotheses are contradictory, you must examine evidence to decide if you have enough evidence to reject the null hypothesis or not. The organization thinks that, currently, the mean is higher.  $H_0: \text{_____}$   $H_a: \text{_____}$  Some of the following statements refer to the null hypothesis, some to the alternate hypothesis. We want to test if more than 40% pass on the first try. Private universities' mean tuition cost is more than \$20,000 per year. The p-value is calculated from the data. At most 60% of Americans vote in presidential elections. Suppose that in a survey of 100 people in a certain town, seven of them suffered from depression or a depressive illness. You want to test to see if the claim is correct. A random sample of 26 first-time convicted burglars in a recent year was picked. Examples: Null Hypothesis:  $H_0$ : There is no difference in the salary of factory workers based on gender. In a population of fish, approximately 42% are female. Null Hypothesis ( $H_0$ ) - This can be thought of as the implied hypothesis. Test if the percentage of U.S. students who take advanced placement exams is more than 6.6%. Hypothesis Testing with One Sample The actual test begins by considering two hypotheses. She surveys 84 of her students and finds that 11 attended the midnight showing. Null Hypothesis:  $H_0$ : Experience on the job has no impact on the quality of a brick mason's work. After four years the girls were surveyed again. Fill in the correct symbol ( $=, \neq, \geq, >$ ) for the null and alternative hypotheses. We want to test whether the mean GPA of students in American colleges is different from 2.0 (out of 4.0).  $H_0: \mu = 34$ ;  $H_a: \mu \neq 34$   $H_0: p \leq 0.60$ ;  $H_a: p > 0.60$   $H_0: \mu \geq 100,000$ ;  $H_a: \mu < 100,000$   $H_0: p = 0.29$ ;  $H_a: p \neq 0.29$   $H_0: p = 0.05$ ;  $H_a: p < 0.05$   $H_0: \mu \leq 10$ ;  $H_a: \mu > 10$   $H_0: p = 0.50$ ;  $H_a: p \neq 0.50$   $H_0: \mu = 6$ ;  $H_a: \mu \neq 6$   $H_0: p \geq 0.11$ ;  $H_a: p < 0.11$   $H_0: \mu \leq 20,000$ ;  $H_a: \mu > 20,000$  Over the past few decades, public health officials have examined the link between weight concerns and teen girls' smoking. Fill in the correct symbol ( $=, \neq, \geq, >$ ) for the null and alternative hypotheses. If you were conducting a hypothesis test to determine if the true proportion of people in that town suffering from depression or a depressive illness is lower than the percent in the general adult American population, what would the null and alternative hypotheses be? The evidence is in the form of sample data. Mathematical Symbols Used in  $H_0$  and  $H_a$ :  $H_0$   $H_a$  equal ( $=$ ) not equal ( $\neq$ ) or greater than ( $>$ ) or less than ( $<$ ) p-value, then reject  $H_0$ . State the null hypothesis,  $H_0$ , and the alternative hypothesis. Once you have developed a clear and focused research question or set of research questions, you'll be ready to conduct further research, a literature review, on the topic to help you make an educated guess about the answer to your question(s). -> Collaborative Exercise Bring to class a newspaper, some news magazines, and some Internet articles. If  $H_0$  has: equal ( $=$ ) greater than or equal to ( $\geq$ ) less than or equal to ( $\leq$ ) then  $H_a$  has: not equal ( $\neq$ ) or greater than ( $>$ ) or less than ( $<$ ) ( $0.20 p < 0.20 p \leq 0.20$  Previously, an organization reported that teenagers spent 4.5 hours per week, on average, on the phone. Describe in words,  $H_0$  and  $H_a$  are contradictory. This educated guess is called a hypothesis. In groups, find articles from which your group can write null and alternative hypotheses. Alternative Hypothesis ( $H_a$ ) - This is also known as the claim. In an issue of U. In research, there are two types of hypotheses: null and alternative. The null and alternative hypotheses are:  $H_0: \mu \geq 5$   $H_a: \mu < 5$  Try It We want to test if it takes fewer than 45 minutes to teach a lesson plan. "Null" meaning "nothing." This hypothesis states that there is no difference between groups or no relationship between variables. Simply that nothing is different than we expect it to be. The alternative hypothesis is:  $p < 0.30$   $p \leq 0.30$   $p \geq 0.30$   $p > 0.30$  A statistics instructor believes that fewer than 20% of Evergreen Valley College (EVC) students attended the opening night midnight showing of the latest Harry Potter movie. Null Hypothesis:  $H_0$ : There is no relationship between height and shoe size. The choice of symbol depends on the wording of the hypothesis test. The distribution of the population is normal. They work as a complementary pair, each stating that the other is wrong.  $H_a$  never has a symbol with an equal in it. Its value is set before the hypothesis test starts. A test is conducted to see if, in fact, the proportion is less. News and World Report, an article on school standards stated that about half of all students in France, Germany, and Israel take advanced placement exams and a third pass.  $p > 30$  Try It A medical trial is conducted to test whether or not a new medicine reduces cholesterol by 25%. The random variable is the mean Internet speed in Megabits per second. In other words, the difference equals 0. Researchers surveyed a group of 273 randomly selected teen girls living in Massachusetts (between 12 and 15 years old). Fifteen randomly chosen teenagers were asked how many hours per week they spend on the phone. These hypotheses contain opposing viewpoints. We want to test if college students take less than five years to graduate from college, on the average. If you were conducting a hypothesis test to determine if the population mean time on death row could likely be 15 years, what would the null and alternative hypotheses be? This hypothesis should state what you expect the data to show, based on your research on the topic.  $H_0: p \leq 0.066$   $H_a: p > 0.066$  Try It On a state driver's test, about 40% pass the test on the first try. Discuss your hypotheses with the rest of the class. Europeans have a mean paid vacation each year of six weeks.  $H_a$ , in terms of the appropriate parameter ( $\mu$  or  $p$ ). The random variable is the mean number of children an American family has.  $p \leq 30$   $H_a$ : More than 30% of the registered voters in Santa Clara County voted in the primary election.  $H_0: \text{_____}$   $H_a: \text{_____}$  The National Institute of Mental Health published an article stating that in any one-year period, approximately 9.5 percent of American adults suffer from depression or a depressive illness. They are "reject  $H_0$ " if the sample information favors the alternative hypothesis or "do not reject  $H_0$ " or "decline to reject  $H_0$ " if the sample information is insufficient to reject the null hypothesis. Fewer than 5% of adults ride the bus to work in Los Angeles. You are testing that the mean speed of your cable Internet connection is more than three Megabits per second. You are testing that the mean speed of your cable Internet connection is more than three Megabits per second. The mean starting salary for San Jose State University graduates is at least \$100,000 per year.

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