Hi. This tutorial covers significance level, also known as the probability of making a type I error. All right. Let's start with an example. Suppose you're interested in showing that the majority of people in your neighborhood support a proposal for a new city ordinance. If you're going to address this with a hypothesis test, we would need to start by writing a pair of hypotheses.

Let's start with the null hypothesis. Remember, the null hypothesis, we need to start with our population parameter. And the null hypothesis is always an equality statement. If we're thinking about a majority, we're thinking about a proportion.

And our null hypothesis is, we're going to assume that the population proportion equals 50%, or 0.5. What we're going to do is just let our null hypothesis be that p is equal to 0.5, where p represents the proportion of the neighborhood population that support the new ordinance. And then we would also need an alternate hypothesis. If we're trying to show that the majority of people support, our alternate hypothesis is that p needs to be greater than 0.5.

If we are then going to run our hypothesis test, we would eventually come up with some sort of conclusion. And what we want to do is, you plan on citing the results of the test in a letter to the editor in a local newspaper. What we need to think about are the two different errors that can pop up in this type of hypothesis test. Let's consider the type I and type II errors in this setting.

A type I error is, you conclude that a majority of residents support the proposal when no majority is actually present. And a type II error is, you conclude that the majority of residents do not support the proposal when a majority is actually present. We want to kind of think about which type of error may be-- the implications, I guess, of each type of error.

If we look at a type I error, in this case, if you're going to-- if this is going to be the results of the test and we end up putting this in the newspaper, a type I error here would basically be false advertising. You would be using a false conclusion to support your claim.

Now, a type II error, chances are, if you concluded that a majority of residents do not support the proposal, you probably wouldn't put that information in the newspaper in general. I would say, in this situation, a type I error might be a little bit worse.

Depending on the context of the problem, and what would be the impact of a type I error, is where we set a significant level. Significance level is the probability of making a type I error. In that last

example, we would want the probability of making that type I error to be pretty small. And the significance is abbreviated with the Greek letter alpha. I generally make alpha like that.

Prior to running a hypothesis test, a level of significance must be decided upon. We have some commonly used significance levels. We commonly use the 1% significance level, a 5% significance level, and a 10% significance level. So the alpha values would be 0.01, 0.05, or 0.1. And the 5% level is a common default significance level. You'll see, most hypothesis tests are run at a 5% significance level.

In this case, if you're doing the newspaper example, you would want your alpha value, probably, to be pretty low. So I'd say 0.01 or 0.05, probably would be OK running your tests at either of those levels.

Now, the one thing is, is that if you decrease your level of alpha, your likelihood of making a type II error goes up. Decreasing alpha increases the probability or the likelihood of making a type II error. All right. This has been your tutorial on the significance level, also known as the probability of making a type I error. Thanks for watching.