This tutorial covers hypothesis testing for population proportions. Now, hypothesis testing for population proportions follows the same steps as z-tests and as t-tests. We'll review those in just a moment. Additionally, the conditions are the same. The data is obtained from a simple random sample or a sample that can be treated as random, and observations are independent.

Additionally, in order to check for normality, we need the expected successes to be greater than or equal to 10. And the expected failures to be greater than or equal to 10. Let's look at those steps again.

So first we need to formulate the null and alternative hypotheses and choose a significance level. Then we need to check that the conditions of the hypothesis test are met for the random samples we use. Third, we need to calculate a test statistic and compare to a critical value or find the p value and compare to the significance level.

Now, here with the third step, typically technology is used. We'll do a short example where you don't need technology, but often it is used. And then last we need to decide whether to reject or fail to reject the null hypothesis and then draw a conclusion.

Here we're going to look at a z-test for population proportions in our example. And that is a hypothesis test for population proportions that uses the z-statistic. Now, this test statistic that we're going to calculate is the same as one we did before for z-statistics. And it's p hat minus p naught divided by the square p naught times q naught divided by n. And the standard error is the square root of p times q divided by n. So let's take a look at an example.

In this example, a teacher believes that 80% of her students do their homework. To test this claim, she surveyed 15 of her students using a simple random sample. Among the sampled students, 67% had completed their homework. Based on these findings, can the teacher reject her hypothesis that 80% of her students do their homework?

Now, when we look at this our null hypothesis is that the proportion is equal to 0.80. The alternative hypothesis is just that it's something different. And our significance level we're going to set to be 0.05.

So now we need to check our conditions, and this meets our conditions. And then we're going to calculate the z-statistic. So we have the sample proportion minus the population proportion and then

divide it by the square root of the population proportion times the proportion that does not do it, that expected 0.20. And then divide by the sample size, the 15.

When we calculate this out, we get negative 0.397. Using a z-table, this corresponds to a p value of 0.3446. So because this p value is greater than our significance level of 0.05, we cannot reject the null hypothesis yet. So the teacher cannot reject her null hypothesis that 80% of her students do their homework. This has been your tutorial on hypothesis testing for population proportions.