Hi. This tutorial gives an introduction to sampling distributions.

All right. So let's start by looking at a very simple population. So all the population consists of is five numbers-- 1, 2, 3, 4, 5. So what we're going to do is take 10 samples of size n equals 2 without replacement and where the order does not matter from this population. After taking the samples, let's calculate the sample mean of each of the 10 outcomes.

So basically, the way we're going to do this-- so I'm going to keep track of my data here. But the way we're going to look at this is using-- we're going to simulate sampling from this simple population. So we have the elements 1, 2, 3, 4, 5 on a little piece of paper of the same size.

What I'm going to do is I'm going to crumple them up and kind of mix them up. And I'm going to take 10 samples of size 2 without replacement. So I'm going to take one, and then I'm going to take two. So then unwrapping these, my sample is 5 and 3. So what I'm going to do over here is just mark that as one of my samples-- 5, 3.

I'm going to do this 10 times. So I'll crumple these back up and mix them up. Without looking, I'll grab two of them. We have 3 and 4. OK. So I'm going to mark that. Order doesn't matter here, so 3 and 4.

OK. Mix those back up. Without looking, grab two of them here. We got 3 and 4 again. OK. So that's three times.

Mix them up. Grab these two. 1 and 2. So I'm going to mark that-- 1, 2. Crumple those back up. Mix them back up. And grab two more-- 5 and 2.

A couple more. Mix them up. I got 5 and 2. Again, we're taking samples of size n equals 2, reporting them. And then we're going to calculate the mean of each. So 2 and 5 again.

Put those back in. Mix them up. 4 and 3. 3 and 1. And one more. 4 and 2.

All right. So I have taken my 10 samples of size 2. And now let's go ahead and calculate the sample mean for each of these. So basically, we just have to add them up and divide by 2.

So 5 plus 3 is 8, divided by 2 is 4. 3 plus 4 is 7, divided by 2 is 3.5, 3.5, 1.5, 3.5, 3.5, 3.5, 3.5. That would be 2, and this would be 3. So this would give me a small distribution of sample means.

Now what I'm going to do is I'm going to draw a dot plot that displays all of the outcomes here. So my

smallest value was 1.5. My largest was 4. And I want to make sure that I include the 0.5's on there also. So let's just start at 1 and-- so it'd be 1, 2, 3, 4, and then we'll just put in 0.5's here also. So 1, 2, 3, 4.

OK. And then I can just go through and mark values. So I didn't have any 1's. I had one 1.5. I had one 2. 2.5's, I didn't have any. I had one 3. Now lots of 3.5's-- 1, 2, 3, 4, 5, 6. And I had one 4. So 6, 7, 8 9, 10. All right. So that is 10. Now, what I would label this axis is x bar, because those are my sample means there.

OK. So basically what we just did-- so the dot plot we drew was an approximate sampling distribution of sample means. So basically, we took a sample of a certain size. And we calculated a statistic from each sample and then displayed them on a sampling distribution. So a sampling distribution of sample means is a distribution formed by considering the value of a sample mean for every possible different sample of a given size from a population.

So what we drew is an approximate sampling distribution. So since we didn't consider every single outcome, again, this is just an approximate sampling distribution. To find the actual sampling distribution, what we're going to do is look at now instead of just a sample of 10 of size 2, now this represents all of the possible values.

So again, they were without replacement where the order doesn't matter. So these were all of the possible samples. So now let's go through and just calculate the sample sizes-- or excuse me-- the sample means.

So 1 and 2 is 1.5. This one's 2, 2.5. The sample mean of 1 and 5 is 6, divided by 2 is 3, 2.5, 3, 3.5-- or excuse me-- yeah, 3.5, 3.5, 4, and 4.5.

So same thing. Let's make a dot plot now. So again, before, we did what's called a simulated or an approximate sampling distribution. Now this is going to be kind of the actual sampling distribution. So 1, 2, 3, 4, we're going to be out to 5. OK. And then we'll mark the half values.

So if we go 1.5, there was one 1.5. There was one 2. 2.5, we had 1, 2. 3, we had 1, 2 3's. 3.5, we had 2. 4 and 4.5. And again, these are sample mean values. So this is a sampling distribution of the sample means.

So if we compare the two distributions that we made, this was the actual sampling distribution by considering all of the outcomes. This is our approximate or simulated sampling distribution. Quite a

bit different here. I think if we would have taken more samples instead of just 10, we would have gotten it to be a more similar shape to the actual sampling distribution.

So that has been the tutorial on sampling distributions. Thanks for watching.