Hi. This tutorial covers the mean. All right. A lot of times, when people see the word mean, they instantly think of the word average. So average can actually be represented by multiple different measures.

So we're going to actually define mean as a precise term. The mean is defined as a measure obtained by adding all of the values in a data set and dividing by the number of values. The mean can be used to describe the center, or sometimes we call it the central tendency, of a data distribution.

So the population mean is often unknown and is denoted with the Greek letter mu. So this is our Greek letter mu. A lot of times, I'll draw mu like that, mu.

Since it's coming from the population, and it's used to denote a population mean, the reason it is often unknown is because very seldomly will you have every element of a population. OK? Populations are generally large, so you won't have the entire population. So a lot of times, we'll not be able to calculate mu. OK? Now, the mean of a sample generally can be calculated, and the sample mean is denoted with the symbol x bar. x with a bar over it, so we call it x bar. OK?

So we're going to concentrate more on the sample mean. So if we put the sample mean into a formula, our formula is going to look something like this. So it's x bar equals-- now we have the Greek letter sigma here which represents the sum. We'll talk about that in a minute, and then it has some index values.

So I equals 1, and then at the top it has an n. So what that means is that it's going to sum up all of the x values, starting with x sub 1 and ending at x of n. So if you have 100 values, it's going to add up x1 plus x2 plus x3, all the way up to x sub 100, and then we would divide by the sample size n. So in that case, we would divide by n, where n is the sample size in the Greek letter sigma.

Again, this here represents summation notation, and that's just to provide you with a definition of summation notation. It's a concise way to represent the sum of similar terms which are expressed following the sigma. OK? So it's basically anything that's after that sigma, that's what we're going to be adding up.

So now, let's actually find the sample mean of a data set. OK, so pretty simple data set. So what we're going to do first is find the sum of all of these. So I'm just going to do this quickly in the calculator. So I just add all those up, and if I hit Enter here, I get a sum of 105. And then, I'm going to take that sum, and I am going to divide by the sample size which in this case is 9-- 1, 2, 3, 4, 5, 6, 7, 8, 9, so 9 values. OK? Hit Enter there, and I get 11.667.

OK. So to summarize what we just did there, x bar equals the sum 2 plus 2 plus 4 plus 8 plus 8 plus 9 plus 10 plus 10 plus 52. And let's just make sure I have all the values here 1, 2, 3, 4, 5, 6, 7, 8, 9, and I do, and we divided that by 9. We got a sum of 105 five, and if we divide that by 9, we end up with a sample mean approximately equal to 11.667, and that's rounded to the nearest thousandth.

OK. Now, if we interpret that mean, 11.667, and place that within our data set, that would be in between 10 and 52. So 8 out of the 9 values are lower than your mean, and you only have one value that's above the mean. OK? So I would say that this mean right here doesn't do a real great job of summarizing this data set. OK? And the reason is because of this 52-- and remember, we call that 52 an outlier. OK? So that outlier is really distorting this sample mean. OK? We can see that without that outlier you're going to get a mean much more toward the middle of those values, but with that large outlier, you are going to get a mean that seems a little bit higher than maybe you would think would summarize that data set.

So when you have that outlier that distorts it, a lot of times, what we'll say is that the mean is sensitive to outliers. OK? The mean is really influenced by those high, or really high or really low values. OK? So one thing to consider when you're calculating a mean, if you have outliers, you might want to use a different measure of center other than the mean.

So we have another type of mean called the weighted mean. Weighted mean is a type of mean where some data values contribute more than others. So let's take a look at an example.

Suppose you're interested in determining the average amount of money a typical shopper spent on a trip to a sporting goods store. It is known that men spend $22 on a typical trip to the sports store, and women spend $28. It is also known that about 55% of shoppers at this store are men. All right. So let's check it out.

Let's just start by notating our two means. A lot of times, what I'll do is I'll use subscripts to denote between the men and women means. So this is x bar with a subscript of m, so I'll say that as x bar sub m and x bar sub w. So the mean for men was $22. The mean for women was $28.

Now, to calculate the weighted mean, the weighted mean is going to equal each of these individual means multiplied by their weights. So I'm going to take this $22, and I'm going to multiply it by the weight for men. And the weight is 55%, but I want that written as a decimal, so 0.55. So it's 22 times 0.55 plus 28 times 0.45. OK?

So once I add those, that will give me the weighted mean. So let's go ahead and do that, 20 times 0.55 plus 28 times 0.45, and that ends up giving me 24.7. So this is in terms of money, so I'm going to write that as $24.70. OK?

So if we are just to find the average of these two numbers, so if there are weighted equally, we would end up with $25. But since the men are weighted more, this 22 is weighted more than the 28, we're going to get a number a little bit below 25. So we end up with $24.70. So that is how to calculate a weighted mean. So that has been the tutorial on the mean. Thanks for watching.