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SPEAKERS

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Hello, and welcome. In this video, we're going to look at standard deviation. Standard deviation is a measure of the average very variability in a series of values. It represents the average distance from the mean, standard deviation is the most popular measure of variability or spread or dispersion. And it has a very intuitive property to it. And that is always presented in the same units as the values themselves. So let's get started. And we'll go through a definition of standard deviation, we'll look at a simple calculation, and then we'll look at some examples. Let's take a look at our standard deviation formula. Now, the higher the standard deviation, the larger it is. That means the set of values has more variability. Now sigma denotes standard deviation. Looking further at our formula right here, which is our mathematical definition of standard deviation. We have a sigma, sigma means to sum everything to the right of the sigma, that's a Greek letter capital sigma. And we're going to sum up the deviations from the mean. Here we have an I to signify the if value in a series or the if observation in the series, we're going to take that observation, subtract the mean and square it. So we're going to take, we're going to have the squared deviations from the mean. So we've got our XY here, got our deviation from the mean there. Finally, we're going to divide the whole thing by and we're going to divide by n, the number of values in the series. But we have one more operation, which is to take the square root of the entire thing in here. So what are we going to do, we're going to take each observation and subtract the mean. From that observation, we're going to square the deviations from the mean, we're going to add them all up, divide by n, and then take the square root of that entire thing. Let's practice with some examples. So we have our formula to the right hand side here. And we have three examples to work through. So let's find the standard deviation of X. To do that, we need the mean. And the mean is going to be the sum of all the observations divided by the number of observations, which gives us four. And now we want to find the deviations from the mean for each observation. We're going to square each of these. So I've copied all the values here, and now we're going to square them. And we've got one equals one equals one equals one, sum them all up and we get four we want to now divide by n, so we're going to get four divided by n, which is equal to four divided by four. That's just going to be equal to one, and the square root of one is just going to be equal to one itself. So there is the standard deviation of X, where we have the X as a subscript. Now let's find the standard deviation. For the Y series, we can see that y bar is also going to be equal to

four has the same mean as X. And now we want to find the deviations from the mean for each of the observations. So we're going to have one minus four, one minus four, seven minus four, and seven minus four and we're going to square Each of these observations, so we get negative three squared to nine, negative three squared, that's nine. Well, they're all going to be equal to nine. So we have 9999, four nines, sum them together, so we have 36. So the sum of the deviations from the mean is equal to 36. I just dropped the eye here for simplicity. And now we want to divide this by n. So let's do this. 36 divided by n, and we have 36 divided by 436 divided by four, just takes us back to nine. And the last step is to take the square root of this nine, so we could add a square root here, square root there, a square root there, and we're going to find that our standard deviation of Y is equal to three. Now looking at these simple examples, we can see something of value here, we can see that our standard deviation of x was equal to one, and our standard deviation of Y is equal to three. And notice that all the observations in X were one absolute value one distance from the mean. And all the observations and why we're absolute distance, three units from the mean. And notice that this matches the numbers that we got for our standard deviations. If we look at the last series Z, we can see here that it's going to have a deviation equal to zero. Which is that there is no deviation from the mean. For is the mean. And each of the values is four. So it has no no variability. There's no dispersion. All the observations are in one place. There's no spread. There's no distance between going from one observation to the next