Hi. This tutorial covers interpreting intercept and slope. All right, here's the situation. I love to travel. I'm interested in how air fare is affected by the distance to the destination. So I looked up 13 destinations on kayak.com during the same time frame, and I recorded the airfare in dollars of the cheapest nonstop flight to each destination.

I then used Google to determine the driving distance in miles to each destination. So the air path might have been a little different than the driving distance, but I decided to use the driving distance in miles. So all airfares and distances were measured from the Minneapolis/St. Paul airport. All right, here's the distance-- or excuse me-- here's the data that I collected here.

So again, 13 destinations-- so New Orleans, New York, Chicago, San Francisco, Anchorage, Miami, St. Louis, Denver, Las Vegas, Detroit, Nashville, Los Angeles, and Seattle. So again, here the distance values-- so the distance from each of these destinations to Minneapolis/St. Paul. And here are the airfares in dollars.

And then here is a graph of the data-- so distance to destination in miles on the x-axis, airfare on the y-axis in terms of dollars. So we see that there is a positive association between distance and airfare-- I would say probably some sort of moderate association there. So it does look fairly linear, so what we can do is fit a line to the data.

And this is actually the least squares line here. And then here is the equation of that line. So we can see that it's placed on there. So our goal now is to interpret these two values in the context of our problem. So remember that this value is often notated as b sub 0. b sub 0 represents the y-intercept. And this value here is b sub 1, and that represents the slope.

So the slope of a regression equation-- so that's this value-- is the amount y changes on average for a one-unit increase in x. So if we think about what slope is, slope is always the change in y over the change in x-- so the change in y over the change in x. So usually, we think of slope as a ratio. This value-- the way it's written isn't really a ratio, but we can easily make it into a ratio by putting it over 1.

So what it tells you is the amount y changes for a one-unit increase in x. So that's where that slope-- that interpretation comes from. And then the intercept of a regression equation-- that's that b sub 0-- is the expected y value when x is 0. And that's pretty easy to see. If you put 0 in for x here, the y hat value will just be this. Now, it's important to interpret the slope and intercept in context, so that's what

we're going to do next.

Let's start with the intercept. So the intercept is 299.58. It's also important to think about what the units are for each of these values. So if we think about the units, b sub 0-- so it's when x is 0-- so this is just a value of y hat. The y values were measured in dollars, so the intercept will also just be measured in dollars. So the units here are $299.58.

So to interpret that value, if x equals 0, y equals 299.58. If the distance to the destination is 0 miles, the airfare will be expected to be $299.58. Now, the only issue with that is that, first of all, you're not going to take a plane ride to somewhere that you're at, so it doesn't really make a lot of sense for that to be an airfare. But this just gives us a starting value.

So a lot of times, like in this case, your y-intercept won't give you a very meaningful interpretation. Sometimes even your y-intercept will end up being negative, even though a negative value isn't possible. That's another case where the interpretation of your intercept doesn't really give you much meaningful information. Your slope, though, will always be meaningful, so let's think about the units again on here.

So remember, we said the slope was the change in y over the change in x. So the units for this will be the y units divided by the x units. The y units are dollars. The x units are miles. So what this will end up being is this will end up being dollars per mile. So another way to think about this would be about $0.14 per mile would be the units here.

So to interpret that, we would say, for a one-mile increase in distance to destination, the airfare will increase by about $0.14 on average. And I think that should make sense, that for every 1 mile further you go, you would expect your airfare to go up a little bit, and it's going to go up by about $0.14. So this is an interpretation of your y-intercept. This is an interpretation of your slope. It's important to be able to do both of those in context. All right, so that has been your tutorial on interpreting intercept and slope. Thanks for watching.