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SPEAKERS

Catherine Pfaff

Welcome. In this lecture, I'm going to give a little bit of language when we talk about taking derivatives. We usually say with respect to, and so I kind of want to go through this because this is very important. So we need to know when we're differentiating. So need to know when we're differentiating, when differentiating what we're differentiating with respect to. So what we're differentiating and then this is kind of the, the, the kind of new terminology which is, say with respect to.

Okay, or and we abbreviate, this is a very common abbreviation, this is one that you'll need to know. So it's good, good to get used to. So we have with respect to WRT. Okay? And so what is that? So i.e. we're looking at, we're looking at well, okay, so we could be looking at. So over here, I'll focus on how the output values for F changes as X changes. So how the output values for F, so if you have a function F, how the output values for F change as our X changes.

Okay, so let's look, kind of look at an example here. So if I had an a function, which was like, so let's say I had the function where I had F of X is going to equal 3X squared plus 1, okay? And then what would I write, so for the, you know, for the derivative, I would write to write D, DX. If I'm differentiating, I would write this, I'm taking the derivative with respect to X. Or another way to write this, oops, this is this F, so let's make that green. We have it green everywhere else. Another way to write that would be like DF dX. Okay, for what we've seen kind of before, let's this X, let's make sure we get the colors everywhere. So you can kind of see what I mean, would be a way to write this for F prime of X. So this derivative in all these circumstances, I'm taking the derivative of F with respect to X, right? So this tells me, so I know the rate of change with respect to X. So know the rate of change with respect to X.

Okay, so that's kind of one setup. But let's move on look at this with a little bit different of notation, just to get an idea of what we mean to not get fixed in one notation. Okay? So, oh, also, I'm going to box these, so that this is kind of new notation. I want to make that clear that this is kind of new notation that you should focus in on. Make sure you understand. Okay? This one we're going to do,

sorry. Something here that's irritated my throat a little bit. Okay, so how the output values let's, maybe instead I'm looking at for now, maybe my function is G, change. And here I'm going to look at as T changes.

Okay, so, so let's look at an example. So in this circumstance, so here's our example, which is that, so let's look at where I have G of T is equal to E to the T minus log of T. Okay? So if I'm looking at something like this, then I'm going to write, and now I'm going to have, so I want to take the derivative with respect to T, because it's kind of the input, and that's what's changing. Sometimes you have more than one input, here, we're just looking at one input, I want to make sure that matches up. So I'm looking at how, oops, so I'm looking at how I'm going to take the derivative with respect to T of G. So looking at how G changes as T changes, or some other notation would be where I have DG DT. And this would be for if I had G prime of T, okay, so this is notation for the derivative of G with respect to T. So this gives me the rate of change with respect to T.

So the rate of change of G with respect to T, or the output values change as I change the input. Okay, so I want to give a little bit of a caution here, which I'll talk more about in other lectures. Okay, so here's kind of my caution, which is that, so when I'm writing DF DX, and DG DT, these are still functions. Okay, so we don't get values. So we don't get values, right, for the slope, or the rate of change, for the slope or rate of change, right, until we actually input some, right, until we have an input. So until we input some, right, X equals A or T equals A, right? So in this circumstance, right, this is a function, we don't get out values until we input X equals A. In this one, we, it's a function, we don't get out values until we actually input something for T. So this one, you have to input something for X, this one, you have to input something for T, has multiple variables, you have to input something for each of those. Okay? This is some new notation. Let's box these ones too.

Okay, so this is just some new notation. And it's going to give us the derivative with respect to X and the derivative with respect to T. You want to be able, you want to be able to specify, you're looking at how your outputs changed with respect to what? Here you're looking at how they change. When you change X, here, you're looking at how they change when they change T. This is new notation to get used to we're going to use it for differentiating. Okay, so, hope that made some sense and I'll see you in the next lecture.