PfaffModule4L04

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SPEAKERS

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Welcome. So in the last lecture, we looked at this kind of chart of values, and we were interested in trying to figure out, well where's the average velocity? Like on what one second intervals is it the fastest? Okay, and we did this by looking at the change in distance divided by the change in time. And it turned out it was here. And now what we want to do is we want to kind of transform that way of thinking to look at the instantaneous velocity. And more in particular, going to look at the instantaneous velocity at 5 seconds. So the process that we're going to do is going to be to zoom in. And this is the zooming in, in kind of the sense of a camera. And not in the sense of these days where we zoom to speak in a video call with somebody. Okay, so this process I'm going to do here is I'm going to zoom in.

Okay, and then I'm going to get a new chart, because our task here is going to be to, so what is our task, is we want to approximate the instantaneous velocity at T equals 5. So we want to approximate the instantaneous velocity at time T equals 5, so we're at time T equals 5, so 5 seconds have passed. So this is going to be kind of this is going to be a value over here. And in particular, it's this value here. Okay? So instead of looking at these 1 second intervals, we're going to look at smaller intervals around there. Okay, so our method is to zoom in, right. So our method is to zoom in. So this is what we mean. So we get a new chart here. So I have my time in seconds, but now I'm looking at times that are close to here. But with like kind of a finer interval, so like 4.8, 4.9, 5.0, 5.1, and 5.2. And then I can kind of draw my chart again.

Okay, so maybe now, so this is again, over here, this is the distance in meters, that I've traveled by that time. And so I had 23.63 and 24.85, and 25.78. Then we have two more times, so we have, or distances. So 26.04 is how far I've traveled after 4.1 seconds, and after, sorry, after 5.1 seconds, and then after 5.2 seconds, I've traveled 26.77 meters. Okay, so let's look at what happens near 5. Okay, so we're going to want to look at those intervals that are very kind of close by there. And so what I'm looking for here, right, so I'm focusing in on this time interval, and this time interval, right? And what I'm going to want is going to be my change in distance over change in time. So I'm looking at a, right I'm looking at a change in distance. So for each of these, it's a change in distance, right, divided by a change in time.

Okay, so we want to figure out the change in time over here. So the change in time here, on this interval 4.9 to 5.0 is going to be, so my change in time over here is going to be now it's point one instead of one. The same thing here, the change in time on the interval from 5 to 5.1 is going to again be point one. Okay, how did I do that? I took 5.0 minus 4.9. Right? So this is equal to, how did I get this? I took 5.0 minus 4.9. And then I got that that was equal to point one. And here I took 5.1, right, so what I did was 5.1 minus 5.0, and I got point one, okay? So now I know what goes on the bottom. So on the bottom, I'm going to get point one for each of these. And then on the top, I need to take the change in distance there. So I've got 25.78. So I'm looking at what's on top. I have 25.78 minus 24.85. And on top here, right, I took 25.78 minus 24.85. Here, I need to take 26.04 minus 25.78. So I need to go 26.04 minus 25.78. Okay, and then for each of these, so we could kind of work this out and on the top one, what I'm going to end up getting is going to be, so on the top, I get, so for this one here, I'm going to get 9.3. And for this one here, I'm going to get that this is going to equal 2.6.

Okay, so this is something to think about for a moment is that these are actually not very close to each other. okay? And so what we're going to want to do, right, so and you can kind of think of this as if we're kind of drawing a picture here, what's kind of going on here, what I'm looking at is I've got some, right, this is like in my picture here, I've got 5, I've got 5.1, and I got 4.9. Right, and then I had these values. And so I'm looking at these slopes on either side, right? But the key point is that on this side, right, you could think of this as I'm looking at my, I'm looking at a left hand limit, versus a right hand limit, right? As we're approaching 5 from each side, what does that change look like? We're trying to approach an instantaneous velocity. These are not close, quite close enough yet. So we're going to want to do is to repeat this zooming in process to maybe look at 4.99 and 5.01, right, so we're looking at a smaller and smaller interval, getting closer and closer to 5, until these two values become much more the same, okay? So we just kind of emphasize this, is that these two values, so this value, and that value, I know I kind of have to snake through there. Okay, so these are quite different. So we're going to want to keep zooming in. And we can zoom in until they're close as we want, as long as our function is nice enough. Okay, so quite different. So keep zooming in until it's close as we want. So keep zooming in until as close as want.

Okay, so what did we do? We wanted to move from an average velocity to an instantaneous velocity. So you kept on looking at the average velocity on the two intervals, right adjacent to 5, right? So 4.9 to 5, and 5 to 5.1. And then, if those two average velocities aren't close enough, then we're going to want to zoom in again and look at 4.99 to 5.01, and so on until we get close enough that these are actually kind of matched up, and then that's going to get closer and closer to the instantaneous velocity in the limit. Okay, so I hope that made some sense, and I'll see you in the next lecture.