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SPEAKERS

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Welcome. In this lecture, I'm going to kind of go through this example, which you can see, and I'll read it to you. And we'll kind of go through a little bit the setup and explaining and how we would look at a solution to this. So we're in the land of Faffian and there lives a blue tailed rodent, whose tail can't survive extreme temperatures. Okay, so it's tails going to fall off if there's an extreme temperature. The dependence on the number of tails falling off per day on the temperature is given by, okay, now we have a function. So this is something to write down. So we have G of T is going to equal and it says $3T$ squared plus 1. So $3T$ squared plus 1, this in orange our input. That's what I was doing there. Where, so this is T is the temperature in Celsius. So this is the temperature in Celsius. So temperature in Celsius, and this is the number of tails falling off per day. Okay. So this is going to give me the tails per day, we know that we mean off, okay. So at temperature T , I'm going to lose that many tails per day. That's what I, first thing I get out of this. Okay. And then I have two questions here. And I'm actually going to write down the questions. So the first one asks how many tails will fall off per day, when the temperature is 1 degrees Celsius? Okay, so tails per day off when, and then I said, the temperature is equal to 1 degrees Celsius. Okay, well, looking at that I can already kind of identify, so 1 degrees Celsius. So this is like, this is a T . Okay? Tails off per day tells me right, this is precisely what this function does for me. So this is going to tell me that I'm actually looking for G at, so T equals 1, so at 1 degrees Celsius. So this is what I'm actually looking for, in the first part. And then the second part is going to be I'm going to be looking for, so it reads that is there another temperature at which the same number of tails will fall off in a day. Okay, so another temperature. And let's say the temperature, we're going to give it a name here. So another temperature and maybe this is like a T prime. Just means I'm looking at another one. Okay? With, right, and so I want the same number of tails off. So with the same tails per day off.

Okay, and this is a, this is an orange, because this is, goes in the function that's a T prime. Okay, so what does it mean that it's the same tails per day? Tails per day is obtained by G , I want that to be the same thing as G of 1. Okay, so I'm looking for G of this T prime is going to equal G of 1. Okay, so now we know kind of what I'm looking for. And I can go ahead and graph this. So it's a good idea. So I have my T axis. And I have my Y , I'll just go ahead and call the Y axis or not label it at all. Right, this is another axis. And then this is the graph, right? So I have the graph of this function. And this is going to be, so this is the graph of and I have G of T equals right, I have this from over here. I'm looking at this graph over here. Okay, so this graph here is G of T is going to equal $3T$ squared plus 1.

Okay, now the first thing I need in solving this is going to be, so I'm looking for, I have a point on here. Right, I'm looking for when T equals 1, Right? I'm looking for this point. So this point here, which is going to be what I would get when I put 1, and then I put in G of 1. Right, that's how graphs of functions work like that. Okay, so this is actually the point that I'm looking for. But let's just kind of go ahead and write this down. How I'm going to get this. So so we're going to work on 1 first. So for 1, we're going to do G of 1. And then we have to put this into the function. So this is going to equal and as I always say, it's good for the first time around to just put parentheses so you don't get yourself confused. And then right where I had the T I put parentheses, and then I can go ahead and put that 1 in there. Right? And then I can just go ahead and compute this out. So this is equal to, so $3, 1$ squared is just 1, right? That's, so it's 3 times 1 plus 1, 3 times 1 is equal to 3. So I have 3 plus 1, which is going to equal 4. Okay, so the answer to 1 is actually 4 tails per day. We'll go ahead and box that, because that's the final answer. And we can, you know, and we can put that as this point here. So at this point, this is going to equal, this tells me we have a 1. And then our second coordinate there is, is 4, right? Coming from G of 1. We computed that for ourselves, okay.

And you can see that is the height here, right, that's gonna give me this height here, which is 4. Oops, this is 4, right? So when my T coordinate is 1, my output coordinate, my height coordinate is 4. And I just got that by plugging it into the function. Now let's look at the second one. So I have I'm looking for I want that G of T . Yeah, okay. Well, no, it's too complicated to have this be T prime. Let's just make it a T . Even though it's a specific T , solving for that T , it's okay. Okay, so, I'm going to set these equal to each other, right? But I'm setting these equal to each other when I now know that G of 1 equals 4. So this is 4, right? So what I'm really looking for here is I'm looking for G of T equals 4, right? But what is G of T , and that's from right up here. So this is equal to, right, so this is like saying I have $3T$ squared plus 1 equals 4. I'm just plugging in what I know G of T is. Okay, so now we can work with this over here. So taking this from here, draw an arrow, boom, boom, boom, boom, boom, boom. Okay, so we have, let's just rewrite it. So we have $3T$ squared plus 1 equals 4. Okay, I'm going to subtract 3 from both sides. Sorry, subtract 1 from both sides, and I get 3. Okay, so subtract 1 from both sides. Okay, so I can do that. So I'm going to get, I still have the $3T$ squared plus 1. But I need the $3T$ squared, but I've subtracted off 1, so I no longer have that. Okay, good. And then I subtracted off one from this side, so I get down to three. Great. Now I want to get rid of this 3 in front, so I divide both sides by 3. Always do the same thing both sides. Okay. So divide by 3, and I'm going to get that T squared. It's gonna equal, it's 3 divided by 3, that's just equal to 1. Now I'm left with T squared equals 1, but I know that that only happens when T equals plus or minus 1.

Okay. So I know that T is going to equal plus or minus 1. But I've already looked at the one circumstance and I wanted another value. So the answer is going to be minus 1 degrees Celsius. Okay, so my answer is T equals minus 1 degrees Celsius. Again, why? Why didn't I say that 1 was my answer? Because I'm looking for another temperature. And I've already looked at the temperature 1. And the interpretation over here is I'm looking for something else at the same height, right? So I'm looking for this point here, okay. But we figured out that that point here is going to be minus 1. Okay. So that at 1 and minus 1, I get the same value. And looking at this up here, this tells me that I have this other point at this exact same height because it has the same output value of minus 1, G of minus 1 that I actually had that this is going to equal just what I wanted to equal, which is the same thing as here. So minus 1, 4.

Okay, so there are kind of, there were two parts to this problem. In the first one we just wanted to know how many tails are gonna fall off at the temperature of 1 degree Celsius. So we're just gonna stick that into the function, and that corresponds to this point, where I have 1 G of 1, right and then sticking it in, that gives me that I have 1, 4. And then now I'm looking for another temperature, that's going to give me the same thing, which is 4. So I need that G of T is going to equal 4. But this is the formula for G of T, so that's setting $3T^2 + 1$ equal to 4. And then I just needed to do a little bit of arithmetic. I'm going to subtract 1 from both sides and we divide 3, then this is isolated. How do you get 1 by squaring something? You have to be 1 or minus 1? Why did I say my answer is minus 1? Because I said I was looking for another temperature when I already know that temperature, originally I was looking at was 1, okay? And that gives me another point the outputs have to be the same, which means that it's at the same height right? Because the second coordinate tells me the output and the second coordinate tells me the height, so output goes with height. Okay. So, I hope that made some sense and I will see you in the next lecture.