

PfaffModule11L13

📅 Thu, 2/17 3:50PM ⌚ 7:40

SUMMARY KEYWORDS

global, domain, boundary, max, highest peak, min, equal, hilltop, function, lowest, valley, occur, local, require, peak, possibly, output, nearby, circumstance, point

SPEAKERS

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Welcome. In the last lecture, we talked about these local min and maxima where you only kind of care about what happens close to your value A, B that then you're going to stick into your function. And so local maxima was like a hilltop high, a local minima was like a valley low. Now, we're going to be looking at, you know, I don't just want the local like the hilltop, I want to know the very highest peak, or the very lowest valley, okay? And I'm going to start it out with because in the previous time, I said I wasn't allowed to be on the boundary of my domain. Now I am, so for, and so I'm going to kind of start out by by clarifying that, or emphasizing that. So for global max or min we'll, max or min, we have that A, B is allowed to be on the domain boundary. Can be anywhere in your domain, can be anywhere in your domain. So as long as I'm in the domain, if it's the highest point or the lowest point, then I'm good. And sometimes actually, the external will be on the boundary of the domain. Okay? So we for, for $F(X, Y)$, so $F(X, Y)$.

It's going to have a, so we're going to say has a global max at A, B , so a global max or maximum, oops, I meant for this to be green. So it's going to have a global max at this point A, B . Ah, it has a global max of, I was trying to figure out the wording to get this all in one sentence. The, it has a global max $F(A, B)$ at A, B . There we go, we got it all in one sentence. So that's good. Okay, so it has this global max at the point A, B , when we have, so now we're going to say, so this is going to happen if, right, when I apply this function F . So I'm going to get the F of A, B and this is my global max right, is going to be greater than or equal to F of, and now we're going to put any X, Y in here. And this is going to work for all points X, Y , not just on the boundary. So for, or not even nearby, so for all so not just nearby points X, Y in my domain.

Okay, and then for global min, and then I'll do kind of both of the pictures together. So for global min $F(A, B)$. I'm required, so for a global minimum, and the minimum value is $F(A, B)$ is located at A, B . Now I'm going to require, so this is kind of the opposite one, except that I'm still requiring that I'm looking at all the points. It has to really be the smallest. Okay, they're really the smallest output I could get. So, A, B if A, B is less than or equal to $F(X, Y)$. Okay? So for all, not just nearby points, so not just nearby points X, Y in the domain. So points X, Y in the domain.

Okay, so you can think of a circumstance where I have so here's my, you know, down here. Maybe actually, so maybe my domain is actually, it kind of looks like maybe this is actually my domain. Maybe I'm not defined everywhere, maybe this is my domain. Right? And maybe I have a function that somehow or another, when I draw the graph of it, like somewhere up here, it's going to kind of peak. So maybe it's going to kind of look like this. Okay? So this is my Z equals F of X, Y . So this is like my Z goes up like this. And I could have, so there could be, you could see like, this is going to be a global max. So this is my F of A, B , being a global max.

Right, because it really is the highest point. It's not just a hilltop high, this is like the very highest peak. Okay? And it's okay that possibly, so maybe this came from a point A, B on the boundary. So it's okay if it's on the boundary like this. It's also okay if it's not, so maybe this one here is going to come from, so this $F(A, B)$ would be my global min. Let's move this up, so it's not in the way of you're seeing when I'm writing. Z equals F of X, Y . Okay, so this would be the global min and maybe it occurs at somewhere on the inside, it's okay. It's allowed to occur on the inside and it's allowed to occur on kind of the boundary. Okay, so, right in this circumstance, so I have, there's the global max, which is really the very highest peak, it's like, you know, mountain, like the highest mountain peak top that you could possibly get to. This global min is like the very lowest valley. It's okay, you know, they may occur, they may be the output coming from something on the boundary of your domain and that's okay. But it could also come from the inside and that's also okay. Okay? So I hope that made some sense, and I will see you in the next lecture.