6. Partial derivatives

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Review

A tricky question about partial derivatives

So usually if I decrease y a little bit and the function

gets bigger, that would usually mean that this is negative.

And that's why some people say that it's negative.

Of course, it can't be both positive and negative.

And maybe that's why some people say that it's 0.

So here's what I'd like you to do--

to answer this, there are two nice ways

to think about this question.

And one of them involves reading this graph,

reading the picture of this graph in a subtle way.

So here's what I'd like you to do.

We're going to try to draw a picture where

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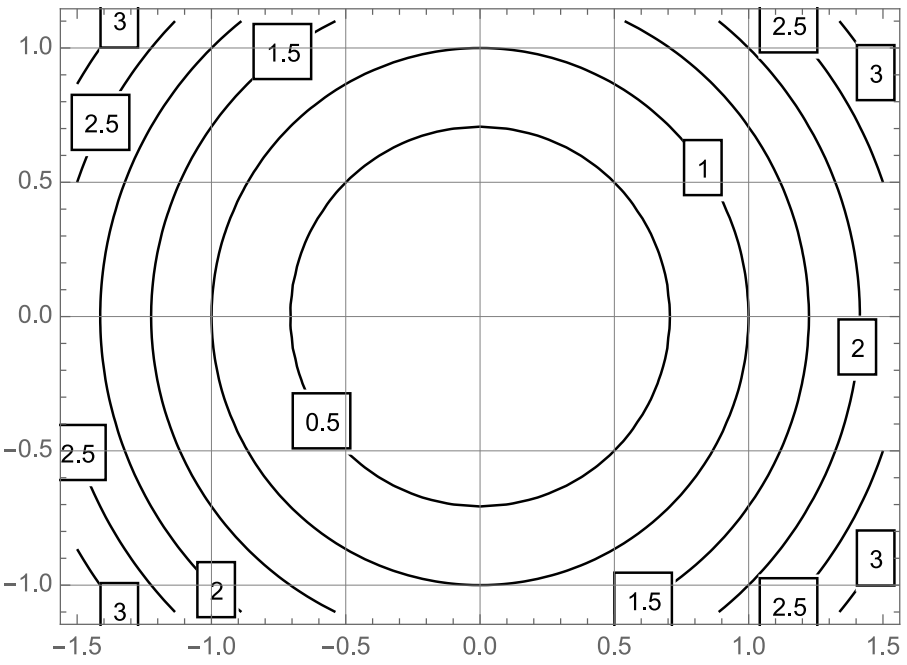
We again consider the function $f(x, y) = x^2 + y^2$. Its level curves are in the image below.



Question: Is $f_y(1, 0)$ positive, negative, or zero?

Why is this a hard question?

Observations:

- If you increase y a little bit, f increases.
- If you decrease y a little bit, f increases.

The linear approximation tells us that

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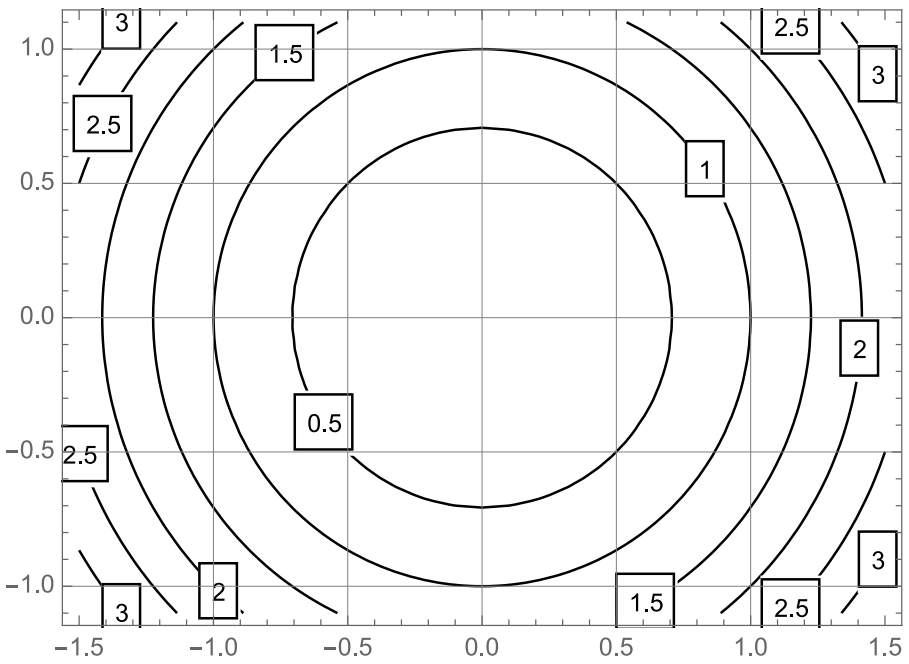
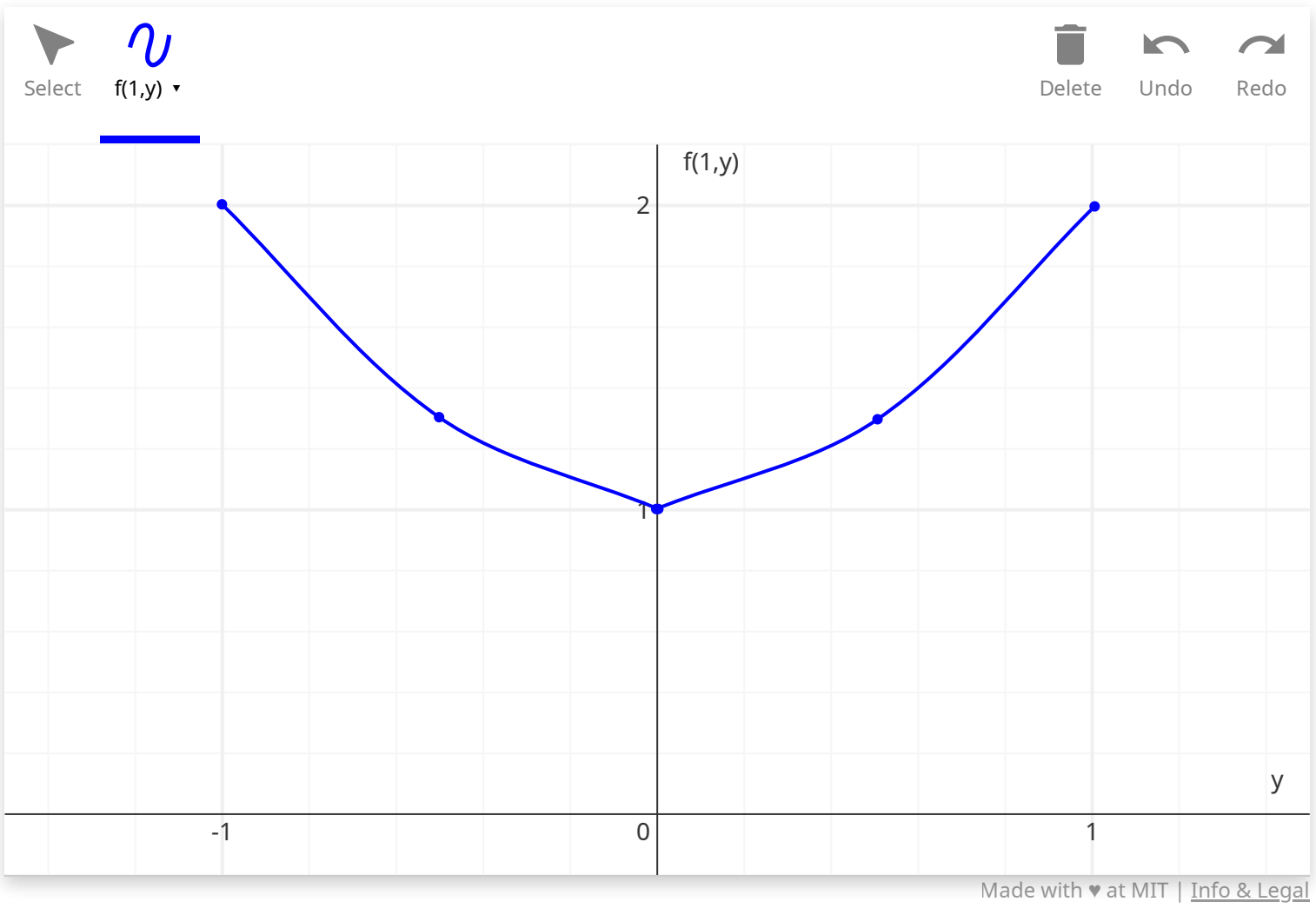
$$f(1, y + \Delta y) \approx f(1, y) + f_y(1, y)\,\Delta y.$$

View the function another way

0 points possible (ungraded)



Sketch the slice of the surface $z = f(x, y)$ by the plane $x = 1$. That is, sketch $z = f(1, y)$ on a graph where the horizontal axis is y and along the vertical direction, plot the value of $f(1, y)$ on the interval $-1 \leq y \leq 1$.



Answer: See solution.

✔ Good Job

Solution:

See the video and on the next page for the solution.

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Answers are displayed within the problem

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