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14. Partial derivatives for hikers

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Lecture due Aug 4, 2021 20:30 IST Completed

Synthesize

Now, we'll see how what we've learned so far connects to the problem involving Hikers 1 and 2.

Hikers computation 1

2.0/2 points (graded)
Let $f(x,y) = x^2 + y^2$. Compute:

$f_x(x,y) =$ 2*x ✔ **Answer:** 2*x

$f_y(x,y) =$ 2*y ✔ **Answer:** 2*y

? INPUT HELP

Solution:

To compute $f_x(x,y)$, we hold y constant and differentiate with respect to x:

$$f_x(x,y) = \frac{\partial}{\partial x}\left(x^2 + y^2\right) = 2x.$$

Notice that since y is treated as a constant, the derivative with respect to x of y^2 is 0.

To compute $f_y(x,y)$, we hold x constant and differentiate with respect to y:

$$f_y(x,y) = \frac{\partial}{\partial y}\left(x^2 + y^2\right) = 2y.$$

Notice that since x is treated as a constant, the derivative with respect to y of x^2 is 0.

Submit You have used 1 of 5 attempts

Answers are displayed within the problem

Hikers computation 2

2/2 points (graded)
Let $f(x,y) = x^2 + y^2$. Compute:

$f_x(-1,1) =$ -2 ✔ **Answer:** -2

$f_x(-2,0) =$ -4 ✔ **Answer:** -4

Solution:

From the previous problem, we have

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$$f_x(x,y) = 2x.$$

Then

$$f_x(-1,1) = 2(-1) = -2$$

and

$$f_x(-2,0) = 2(-2) = -4.$$

Submit You have used 1 of 5 attempts

Answers are displayed within the problem

Recall that, when Hiker 1 started at $(-1,1)$ and moved in the positive x-direction, we deduced from the level curves that the hiker was traveling downhill.

Hiker 2 started at $(-2,0)$ and moved in the positive x-direction. Recall that we deduced from the level curves that Hiker 2 was moving downhill more steeply than Hiker 1.

Think about the sign and magnitude of your answers above. How do these correspond to your answers about Hiker 1 and Hiker 2? Use the discussion forum to explain.

14. Partial derivatives for hikers

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Topic: Unit 1: Functions of two variables / 14. Partial derivatives for hikers

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- Partial derivatives for hikers — 1
  The partial derivative represents the slope of the tangent line that is parallel to one of the coordinate axes. Since the slope is negativ...
- Hiker 1 vs Hiker 2 — 2
  Good morning, I think I understood something. With the partial derivatives something similar happens to what happens with the deri...
- Slope behavior — 2
  Since the partial derivative shows us how *f* changes, the negative sign tells us that they are going downhill, while the number how ...
- Steepness Magnitude — 1
  From the deduction, Hiker 1 which was moving down-hill had a lower negative value which will confirm that it's less steeper than Hik...
- Steepness — 1
- Partial rate of change? — 1
  The partial derivative gives us the instantaneous rate of change when moving in one axis. In this case it is larger in the negative dire...
- Warning about mobile version of page — 3
- An instantaneous 'rate of change' — 1
- Partial derivatives for hikers — 1
  The partial derivatives at (-2,0) and (-1,0) are negative, suggesting they are moving downhill. The absolute value of Hiker 1's derivati...
- Mountain Analogy — 5
- Rate of change

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Relationship of Partial Derivatives to the Contour Plot The signs of the partial derivativs at (-2,0) and (-1,0) are negative, indicating that they are descending. The differences in the absolu...	1
more negative answer Since hiker 2 has a MORE negative answer means that the value of z (i.e. altitude) is decreasing faster when moving in the x direction.	2
rate of descent The walker at (-2,0) experiences a larger rate of descent for a given change in the x-direction than the walker at (-1,1)	1

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