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4. Tangent planes and approximations

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Problem Set A due Aug 4, 2021 20:30 IST Completed

1A-4A

1/1 point (graded)
Let $f(x,y) = y^2 - x^2$.

Compute the linear approximation $L(x,y)$ of $f(x,y)$ near the point $(1,1)$. (Express your answer in terms of x and y .)

$L(x,y) =$

2*y-2*x

✓ Answer: 2*y-2*x

2 · y − 2 · x

? INPUT HELP

Solution:

To compute the linear approximation, we need the values

$$f(1,1) = 0$$

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

$$f_y(1,1) = 2(1) = 2.$$

Then the linear approximation of $f(x,y)$ near $(1,1)$ is

$$L(x,y) = f(1,1) + f_x(1,1)(x-1) + f_y(1,1)(y-1) = -2(x-1) + 2(y-1) = 2y - 2x.$$

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You have used 1 of 5 attempts

Answers are displayed within the problem

1A-4B

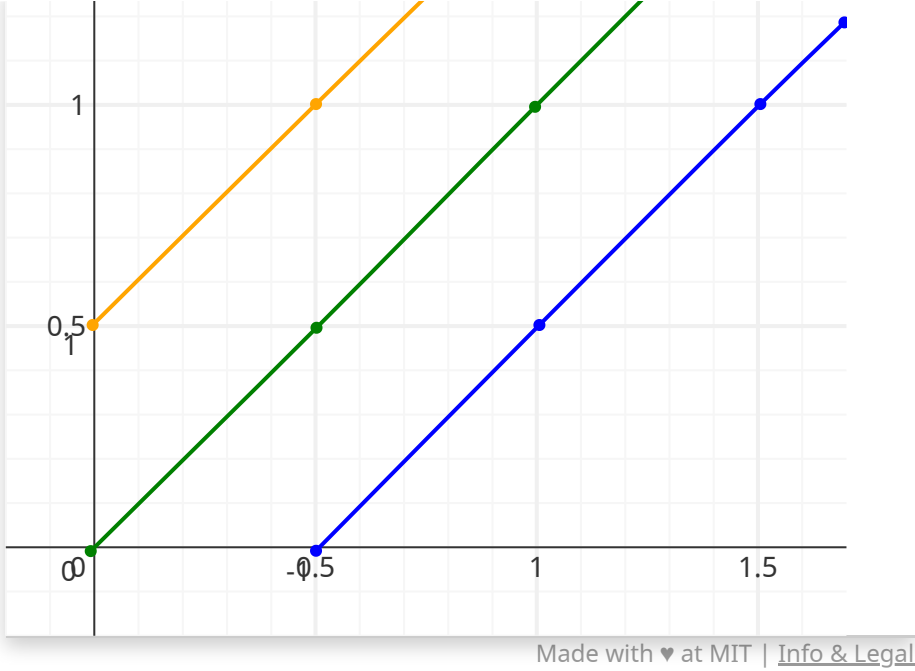
1.0/1 point (graded)
Sketch the level curves of $L(x,y)$ at the heights $-1, 0$, and 1 .

Use the appropriate tool to draw each level curve– use the height 0 tool to draw the level curve of height 0, the height 1 tool to draw the level curve of height 1, etc.



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Answer: See solution.

✓
Good Job

Solution:

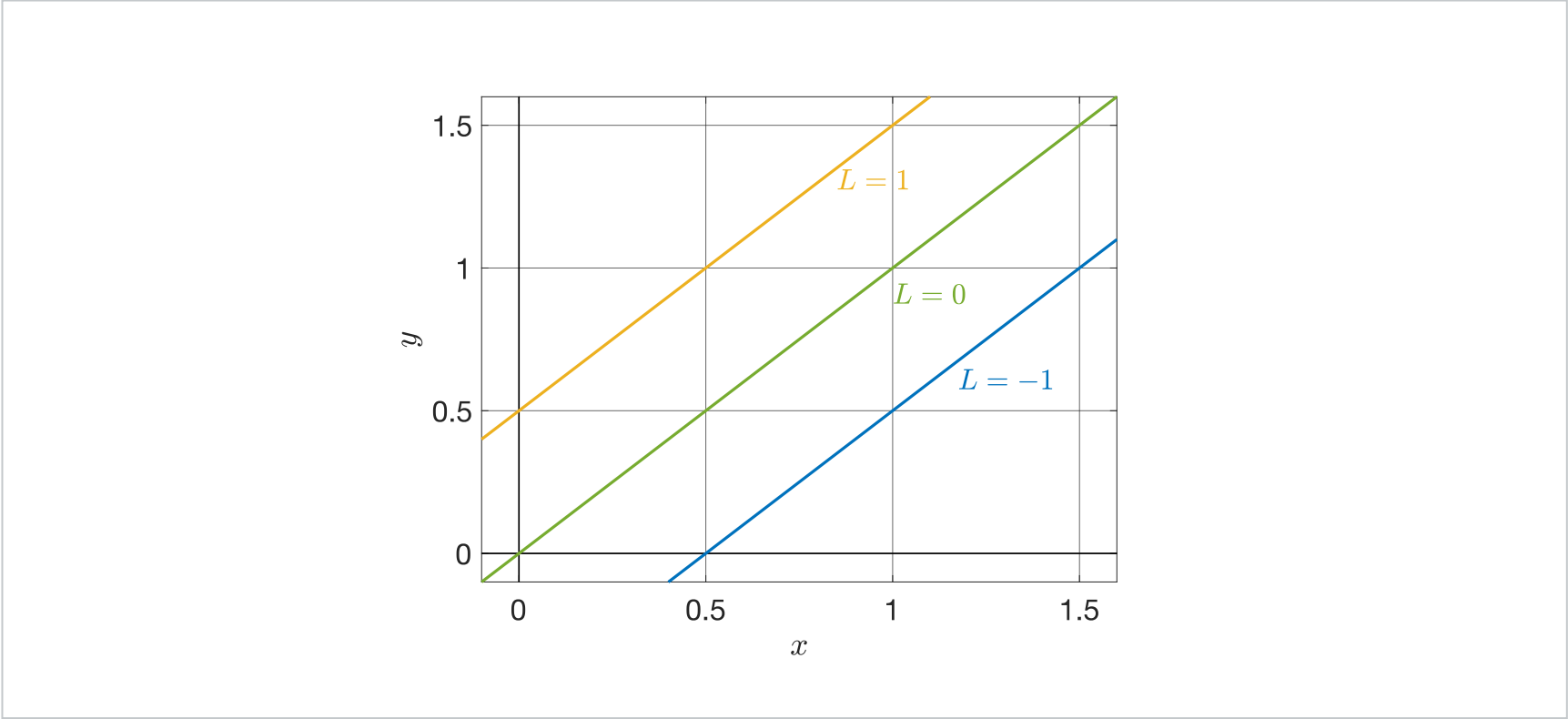
The level curves of $L(x, y)$ at heights $-1, 0$, and 1 are given by the following equations:

Height -1: $2y - 2x = -1 \implies y = x - \frac{1}{2}$

Height 0: $2y - 2x = 0 \implies y = x$

Height 1: $2y - 2x = 1 \implies y = x + \frac{1}{2}$

Sketching these yields the following figure:



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You have used 1 of 10 attempts

i Answers are displayed within the problem

4. Tangent planes and approximations

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