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16. The big picture

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Recitation due Aug 4, 2021 20:30 IST Completed

Synthesize

We continue our exploration of the same function $f(x, y) = y^2 - x^3 + xy - x$.

Since we took the linear approximation of f around the point $(1, 1)$, our approximation is accurate near to $(1, 1)$ but not so accurate far away. To give a sense of that, here is a picture of the level curves of f at a bigger scale.

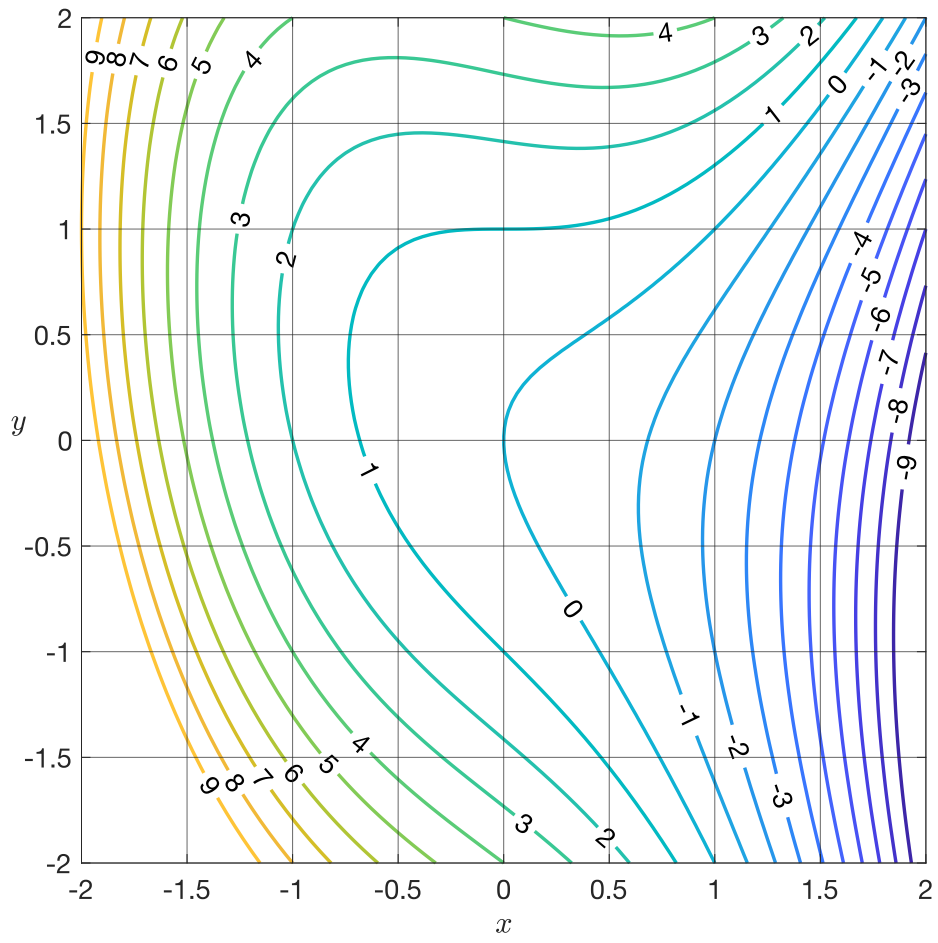

Figure 8: The function f on the interval $-2 \leq x, y \leq 2$.

Food for thought: Reverse the process

1.0/1 point (graded)

Look at the picture of the level curves of $f(x, y) = y^2 - x^3 + xy - x$ near to $(-1, -1)$. Based on this picture, try to guess the linear approximation of f around the point $(-1, -1)$.

Hints:

- What is the height of the level curve that contains the point $(-1, -1)$?
- What is the equation for the linear approximation to that level curve?

Check your guess by computing the linear approximation like you did on the first page.

Near $(-1, -1)$, $f(x, y) \approx$ -4-5*x-3*y ✔ **Answer:** 4-5*Deltax-3*Deltay

? INPUT HELP

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Answers are displayed within the problem

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Food for thought: Find a point of tangency

3/3 points (graded)

Suppose that $g(x,y) = x^2 + y^2$ and P is the plane defined by $z = x + 2y - 10$. The graph of g lies above the plane P. Suppose we raise the plane P (without tilting it) until it touches the graph of g. At what point do they touch?

$x =$ 1/2 ✔ **Answer:** 0.5 $y =$ 1 ✔ **Answer:** 1

$z =$ 5/4 ✔ **Answer:** 1.25

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Answers are displayed within the problem

16. The big picture

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