

Quiz 4

Calculus III

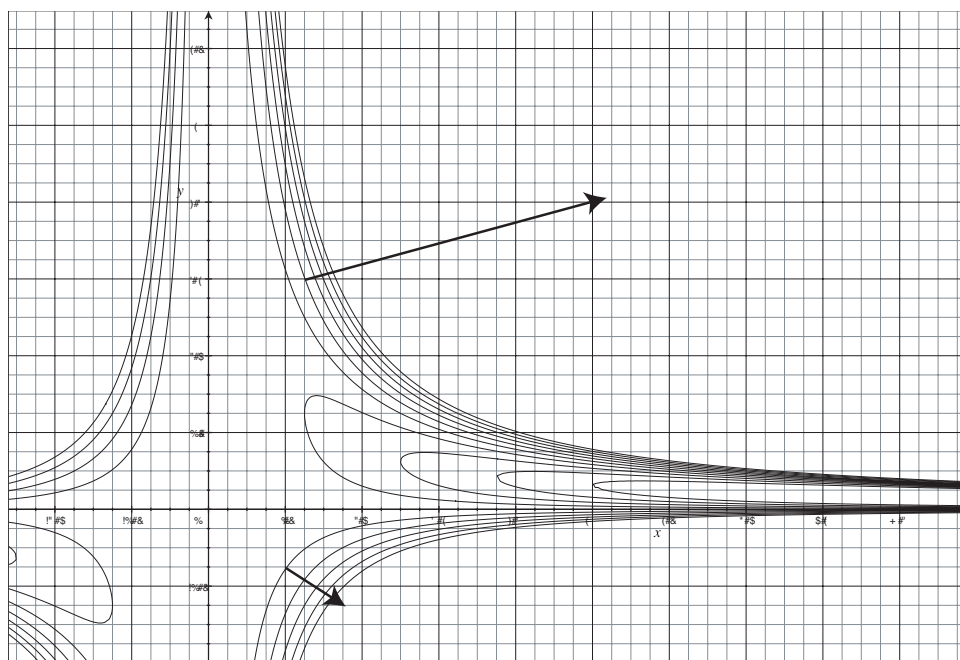
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1. Consider the function $f(x, y) = x^3y^2 - 2x^2y$.

(a) Compute $\nabla f(1, 3)$.

$$\nabla f(1, 3) = \langle 3x^2y^2 - 4xy, 2x^3y - 2x^2 \rangle|_{(1,3)} = \langle 27 - 12, 6 - 2 \rangle = \langle 15, 4 \rangle$$

(b) Sketch the gradient vector computed above on the graph shown below at the appropriate point. Without computing it, sketch the gradient vector for f at the point $(0.8, -0.6)$. Hint: Make sure it points the correct direction and that its length compares to the other vector in an appropriate way.



(c) Suppose that $x(s, t) = st$ and $y(s, t) = s - t$. Compute $\frac{\partial f}{\partial t}$.

$$\frac{\partial f}{\partial t} = \frac{\partial f}{\partial x} \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \frac{\partial y}{\partial t} = (3x^2y^2 - 4xy)(s) + (2x^3y - 2x^2)(-1).$$