

Quiz 3

April 17, 2014

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1. Give definition of $\lim_{(x,y) \rightarrow (x_0,y_0)} f(x,y) = L$. Let $f(x,y) = (x^3 - xy^2)/(x^2 + y^2)$ for $(x,y) \neq (0,0)$. Does $\lim_{(x,y) \rightarrow (0,0)} f(x,y)$ exist? Explain.
2. Give definition of continuity of $g(x,y)$ at a point (x_0,y_0) . Let $g(x,y) = x^2y/(x^4 + y^2)$ for $(x,y) \neq (0,0)$ and $g(0,0) = 0$. Is $g(x,y)$ continuous at $(0,0)$? Explain.
3. Give definition of differentiability of a function of two variables. Is $g(x,y)$ differentiable at $(0,0)$? Explain.
4. Define $w(r,\theta) = f(x,y)$ where $x = r \cos \theta$, $y = r \sin \theta$. Express $w_r^2 + w_\theta^2/r^2$ in terms of partial derivatives of partial derivatives of f .
5. Evaluate $\frac{d}{dx} \int_{x^2}^1 \sqrt{t^3 + x^2} dx$

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