MATH 202
Quiz 5

Name : SOLUTIONS

February 29, 2012

Instructions: Each problem is worth one point. There is no partial credit on this quiz. You get one point for taking this quiz.

1. Show that the following limit does ~~not~~ exist:

$$\lim_{(x,y)\to(0,0)} \frac{x^2+y}{x^3+y}$$

It did exist!

For practice, try $\lim_{(x,y)\to(0,0)} \frac{-x^3+y}{x^3+y}$ and $\lim_{(x,y)\to(0,0)} \frac{xy^2}{x^2+y^4}$

2. Consider the function $f(x,y) = \ln(x^2+y^2+1)$.

   (a) Compute the partial derivative $\dfrac{\partial f}{\partial x}$.

$$\frac{\partial f}{\partial x} = \frac{1}{x^2+y^2+1} \cdot 2x = \frac{2x}{x^2+y^2+1}$$

   (b) Is the function f increasing, decreasing, or constant in the positive x-direction at the point $P(0,1)$. Explain briefly.

$$\frac{\partial f}{\partial x}(0,1) = \frac{2(0)}{0^2+1^2+1} = 0 \quad \therefore \text{ constant, in the positive } x\text{-direction}$$

3. Give the formula for the differential dV for the volume of a box with square base $10 \times 10\,\text{in}^2$ and height $h = 20\,\text{in}$.

$V = x^2 h$

$V_x = 2xh$

$dV = V_x(10,20)\,dx + V_h(10,20)\,dh$

$V_x(10,20) = 2 \cdot 10 \cdot 20 = 400$

$$\boxed{dV \simeq 400\,dx + 100\,dh}$$

$V_h = x^2$

$V_h(10,20) = 10^2 = 100$