Quiz 1 Calc IV (Math2443-003) 6/8/2001

Each problem is worth 5 points. For full credit indicate clearly how you reached your answer.

5 1. Find $\lim_{(x,y)\to(0,0)} \frac{x^2}{x^2+y^2}$, or show that it does not exist.

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

Set $y=0$:
$\lim_{(x,0)\to(0,0)} \frac{x^2}{x^2+0^2} = \lim_{x\to 0} \frac{x^2}{x^2} = 1$

Set $y=x$
$\lim_{(x,x)\to(0,0)} \frac{x^2}{x^2+x^2} = \lim_{x\to 0} \frac{x^2}{2x^2} = 1/2$

these three are not equal, so the limit DNE!

Excellent

5 2. If $f(x,y) = x^3y - \sin xy + e^{xy}$, find f_x and f_y.

$f_x(x,y) = 3x^2y - \cos xy\,(y) + e^{xy}\cdot(y)$

$\boxed{f_x(x,y) = 3x^2y - y\cos xy + ye^{xy}}$

$f_y(x,y) = x^3 - \cos xy \cdot x + e^{xy}\cdot x$

$\boxed{f_y(x,y) = x^3 - x\cos xy + xe^{xy}}$

Nice

5 3. State the definition of the derivative of a function f(x,y) with respect to y.

Hm, would be the derivative of $f(x,y)$ as only y changes ie keeping every other variable as a constant. Yes.

$$\boxed{f_y(x,y) = \lim_{h\to 0} \frac{f(x,y+h) - f(x,y)}{h}}$$

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