Math2210 Quiz 5 (Sections 12.1, 12.2, 12.3) Summer, 2010 Dylan Zwick

Name Solutions Date 7/19/2010

Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. Let $f(x,y) = \dfrac{3xy^3 - 2\sqrt{x^2+2y^4}}{x^2+y^2}$.

(a) Find $f(2,1)$ = $\dfrac{6-2\sqrt{6}}{5}$

$$\frac{3(2)(1^3) - 2\sqrt{(2)^2 + 2(1^4)}}{(2)^2+(1)^2} = \frac{6-2\sqrt{6}}{5}$$

(b) Find $f(t,t^2)$ = $\dfrac{3t^6 - 2\sqrt{1+2t^6}}{t+t^3}$

$$\frac{3t(t^2)^3 - 2\sqrt{t^2+2(t^2)^4}}{t^2+(t^2)^2}$$

$$= \frac{3t^7 - 2t\sqrt{1+2t^6}}{t^2+t^4} = \frac{3t^6 - 2\sqrt{1+2t^6}}{t+t^3}$$

(c) What is the domain? Domain: $x^2+y^2 \neq 0 \Rightarrow (x,y) \neq (0,0)$

Nevermind

~~(d) Find $f_x(2,1)$ =~~

$$\cancel{f_x(x,y) = \frac{(x^2+y^2)\left(3y^3 - 2\left(\tfrac{1}{2}\right)(x^2+2y^4)(2x)\right) - (3xy^3 - 2\sqrt{x^2+2y^4})(2x)}{(x^2+y^2)^2}}$$

$$\cancel{= \frac{(x^2+y^2)(3y^3 - 2x(x^2+2y^4)) - 2x(3xy^3 - 2\sqrt{x^2+2y^4})}{(x^2+y^2)^2}}$$

2. Find the slope of the tangent to the curve of intersection of the surface $z=4x^2+3y-7$ and the plane $y=1$ at the point $(2,1,12)$.

$$\frac{\partial z}{\partial x} = 8x \qquad \frac{\partial z}{\partial x}(2,1,12) = 16$$

slope = 16

3. Find the limit (or show that it does not exist).

(a) $\dfrac{\lim\limits_{(x,y)\to(0,0)} \tan\sqrt{x^2+y^2}}{4\sqrt{x^2+y^2}}$.

$$= \lim_{r\to 0} \frac{\tan r}{4r} = \frac{1}{4}$$

Answer : $\frac{1}{4}$

(b) $\lim\limits_{(x,y)\to(0,0)} \dfrac{4x^2y}{x^3+y^3}$

Along $x=0$

$$\lim_{y\to 0} \frac{0}{y^3} = 0.$$

Along $y=x$

$$\lim_{x\to 0} \frac{4x^3}{2x^3} = 2$$

Answer: Does not exist.