MATH 202 Name : SOLUTIONS

Quiz 4 October 13, 2009

Instructions: You get one point for taking this quiz.

1. Let $f(x,y) = x^2y + \cos(xy^2) + \ln(xy)$

   (a) (2 pts.) Compute the partial deriviatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$

$$\frac{\partial f}{\partial x} = 2xy - \sin(xy^2)[y^2] + \frac{1}{xy}\cdot y$$

$$= \boxed{2xy - y^2\sin(xy^2) + \frac{1}{x} \quad x\neq 0 \quad y\neq 0}$$

$$\frac{\partial f}{\partial y} = x^2 - \sin(xy^2)[2xy] + \frac{1}{xy}\cdot x$$

$$= \boxed{x^2 - 2xy\sin(xy^2) + \frac{1}{y} \quad y\neq 0 \quad x\neq 0}$$

$$x^2 - 2xy\sin(xy^2) + \frac{1}{y}$$

(MORE LEGIBLE.)

   (b) (2 pts.) Consider the point $P(\pi, 1)$ in the domain of $f(x,y)$. Give the instantaneous rate of change of $f(x,y)$ with respect to x at the point P, and determine (with brief explanation) if the function $f(x,y)$ is increasing or decreasing in the positive x-direction at the point P.

(i) Find $\frac{\partial f}{\partial x}(\pi,1)$:

$$\frac{\partial f}{\partial x}(\pi,1) = 2\pi(1) - 1^2\sin(\pi(1)^2) + \frac{1}{\pi}$$

$$= 2\pi - 0 + \frac{1}{\pi}$$

$$= \boxed{2\pi + \frac{1}{\pi}}$$

(ii) Since $\left.\frac{\partial F}{\partial x}\right|_{(\pi,1)} = 2\pi + \frac{1}{\pi} > 0$, $f(x,y)$ is $\boxed{\text{increasing}}$ in the positive x- direction.