Name: Key
February 12, 2015
MAC 2313.3122
Cyr

Quiz 5
You must show all work to receive full credit!!

Problem 1. (4 pts) Let $f(x,y) = x\ln(y^2)$. Evaluate $f_y(3,4)$ and $f_{yy}(2,3)$.

$$f_y(x,y) = x\frac{\partial}{\partial y}\ln(y^2) = \frac{x\cdot 2y}{y^2} = \frac{2x}{y} \Rightarrow f_y(3,4) = \frac{2\cdot 3}{4} = \boxed{\frac{3}{2}}$$

$$f_{yy}(x,y) = \frac{\partial}{\partial y} f_y(x,y) = \frac{\partial}{\partial y}\left[2xy^{-1}\right] = \frac{-2x}{y^2} \Rightarrow f_{yy}(2,3) = \frac{-2\cdot 2}{3^2} = \boxed{\frac{-4}{9}}$$

Problem 2. (6 pts) Let $g(x,y) = \dfrac{y^2}{x^2+y^2}$.

(a) Evaluate $\lim\limits_{(x,y)\to(0,0)} g(x,y)$ along the x-axis.

Along x-axis, $\lim\limits_{(x,0)\to(0,0)} g(x,0) = \lim\limits_{x\to 0} \frac{0}{x^2} = \boxed{0}$

(b) Evaluate $\lim\limits_{(x,y)\to(0,0)} g(x,y)$ along the y-axis.

Along y-axis, $\lim\limits_{(0,y)\to(0,0)} g(0,y) = \lim\limits_{y\to 0} \frac{y^2}{y^2} = \boxed{1}$

(c) What can you conclude about $\lim\limits_{(x,y)\to(0,0)} g(x,y)$? Explain your answer.

We conclude $\lim\limits_{(x,y)\to(0,0)} g(x,y)$ DNE since the limit along two different paths is not equal ($0 \neq 1$).