

Name: Key
September 29, 2016
MAC 2313.9722
Cyr

Quiz 5

You must show all work to receive full credit!!

Problem 1. (4 points) Given $f(x, y, z) = e^{xyz^2}$, evaluate $\frac{\partial^2 f}{\partial y \partial x} \Big|_{(2,1,2)}$.

$$\frac{\partial f}{\partial x} = yz^2 e^{xyz^2}$$

$$\frac{\partial^2 f}{\partial y \partial x} = \frac{\partial}{\partial y} \left[\frac{\partial f}{\partial x} \right] = z^2 e^{xyz^2} + xyz^4 e^{xyz^2}$$

$$\frac{\partial^2 f}{\partial y \partial x} \Big|_{(2,1,2)} = 4e^8 + 32e^8 = \boxed{36e^8}$$

Problem 2. (5 points) Find the limit of the following function, or show that it does not exist:

$$\lim_{(x,y) \rightarrow (0,0)} \frac{5y^4 \cos^2(x)}{x^4 + y^4}$$

Along the x-axis ($y=0$), $\lim_{x \rightarrow 0} \frac{0}{x^4} = 0$.

Along the y-axis ($x=0$), $\lim_{y \rightarrow 0} \frac{5y^4}{y^4} = \lim_{y \rightarrow 0} 5 = 5$.

Since $0 \neq 5$, the limit does not exist.

Problem 3. (1 point) True or false: if $\lim_{(x,y) \rightarrow (a,b)} f(x,y) = L$ along infinitely many paths containing the point (a,b) , then $\lim_{(x,y) \rightarrow (a,b)} f(x,y) = L$.

False