

"QUIZ" for Lecture 8

NAME: (print!) Jennifer Gonzalez Section: 23

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: qXFirstLast.pdf) ASAP BUT NO LATER THAN Oct. 1, 2020, 8:00pm

1. Find the directional derivative of the function $f(x, y, z) = xy^2z^3$ at the point $(2, 1, 1)$ in the direction $\langle 2, -1, -1 \rangle$.

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

$$\left\langle \frac{2}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}} \right\rangle$$

Dot Product:

$$(2, 1, 1) \cdot \left(\frac{2}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}} \right)$$

$$= \left(\frac{4}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}} \right)$$

2. Find the maximum rate of change of $f(x, y) = x^2 + y^3$ at the point $(2, 1)$ and the direction in which it occurs.

$$\frac{\partial}{\partial x} = 2x \quad \frac{\partial}{\partial y} = 3y^2$$

$$(2x, 3y^2)$$

$$\Delta f(2, 1) = (4, 3)$$

$$\sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5$$