

“QUIZ” for Lecture 8

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22, 23, 24

NAME: (print!) _____ Section: _____

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 $\langle 2, -1, -1 \rangle$.

$f_x = y^2z^3$
 $f_y = 2xyz^3$
 $f_z = xy^2 \cdot 3z^2$
 $\langle y^2z^3, 2yz^3, xy^2 \cdot 3z^2 \rangle$
 $|\langle 2, -1, -1 \rangle| = \sqrt{6}$
 $u = \langle 2/\sqrt{6}, -1/\sqrt{6}, -1/\sqrt{6} \rangle$
 $f(2, 1, 1) = \langle 1, 4, 6 \rangle$
 $\langle 2/\sqrt{6}, -1/\sqrt{6}, -1/\sqrt{6} \rangle \cdot \langle 1, 4, 6 \rangle$
 $= -8/\sqrt{6}$
The requested directional derivative is $-8/\sqrt{6}$

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.

$f_x = 2x$
 $f_y = 3y^2$
 $\langle f_x, f_y \rangle = \langle 2x, 3y^2 \rangle$
 $f(2, 1) = \langle 4, 3 \rangle$
 $|\langle 4, 3 \rangle| = 5$
The maximum rate of change is 5
in the direction $\langle 4, 3 \rangle$