

"QUIZ" for Lecture 9

NAME: (print!) Matthew Sternesky Section: _____

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q9FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 5, 8:00pm

1. Find $\frac{\partial f}{\partial r}$ and $\frac{\partial f}{\partial s}$ as functions of r and s , if

$$f(x, y) = x^2 + 2xy^2 + 2y^3,$$

and the variables are related by $x = r + 2s$ and $y = 3r + 2s$. You do not need to simplify!

$$\begin{aligned} \frac{\partial f}{\partial r} &\Rightarrow f(x, y) = (r+2s)^2 + 2(r+2s)(3r+2s)^2 + 2(3r+2s)^3 \\ &= 2(r+2s)\left(\frac{\partial f}{\partial r}\right) + 4\left(\frac{\partial f}{\partial r}\right)(3\frac{\partial f}{\partial r}) + 6\left(3\frac{\partial f}{\partial r}\right)^2 \end{aligned}$$

$$\begin{aligned} \frac{\partial f}{\partial s} &\Rightarrow f(x, y) = (r+2s)^2 + 2(r+2s)(3r+2s)^2 + 2(3r+2s)^3 \\ &= 2(r+2s)\left(\frac{\partial f}{\partial s}\right) + 4\left(2\frac{\partial f}{\partial s}\right)\left(2\frac{\partial f}{\partial s}\right) + 6\left(2\frac{\partial f}{\partial s}\right)^2 \end{aligned}$$

2. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if

$$x^2 + y^2 + z^2 = 5xyz + 1.$$

$$\begin{aligned} \frac{\partial z}{\partial x} &\Rightarrow 2x = 5yz\left(\frac{\partial z}{\partial x}\right) \\ \left(\frac{\partial z}{\partial x}\right) &= \frac{2}{5yz} \end{aligned}$$

$$\begin{aligned} \frac{\partial z}{\partial y} &\Rightarrow 2y = 5xz\left(\frac{\partial z}{\partial y}\right) \\ \left(\frac{\partial z}{\partial y}\right) &= \frac{2}{5xz} \end{aligned}$$