

"QUIZ" for Lecture 9

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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!
 $x = r + 2s$ $y = 3r + 2s$

$$\frac{\partial f}{\partial s} = \frac{\partial f}{\partial x} \frac{\partial x}{\partial s} + \frac{\partial f}{\partial y} \frac{\partial y}{\partial s} \qquad \frac{\partial f}{\partial r} = \frac{\partial f}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial f}{\partial y} \frac{\partial y}{\partial r}$$

$$\frac{\partial f}{\partial s} = (2x + 2y^2)(2) + (4xy + 6y^2)(2)$$

$$\frac{\partial f}{\partial s} = 4(r + 2s + (3r + 2s)^2) + 2(4(r + 2s)(3r + 2s) + 6(3r + 2s)^2)$$

$$\frac{\partial f}{\partial r} = (2x + 2y^2)(1) + (4xy + 6y^2)(3)$$

$$\frac{\partial f}{\partial r} = (2)(r + 2s + (3r + 2s)^2) + 3(4(r + 2s)(3r + 2s) + 6(3r + 2s)^2)$$

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

(differentiate w/ respect to x): $x^2 + y^2 + z^2 = 5xyz + 1$

$$\frac{\partial z}{\partial x} = 2x + 0 + 2z(z') = 5yz + 5xy z'$$

$$\frac{\partial z}{\partial x} = z'(2z) = 5yz + 2x + 5xy z'$$

$$z'(2z) - 5xy z' = 5yz + 2x$$

$$z'(2z - 5xy) = 5yz + 2x$$

$$z' = \frac{5yz + 2x}{2z - 5xy}$$

$$\frac{\partial z}{\partial y} = 2y + 2z z' = 5xz + 5yx z'$$

$$2z z' - 5yx z' = 5xz - 2y$$

$$z'(2z - 5yx) = 5xz - 2y$$

$$z' = \frac{5xz - 2y}{2z - 5yx}$$