

"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!

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

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

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

$$\frac{\partial x}{\partial s} = 2 \quad \frac{\partial y}{\partial s} = 2$$

$$\frac{\partial f}{\partial y} = 2x + 2y + 6y^2$$

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

$$\frac{\partial x}{\partial r} = 1 \quad \frac{\partial y}{\partial r} = 3$$

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

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

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

$$2x + 0 + 2z \frac{dz}{dx} = 5y(xz') + 1$$

$$0 + 2y + 2z \frac{dz}{dy} = 5x(z + y \frac{dz}{dy})$$

$$2x + 2z \frac{dz}{dx} = 5y(x \frac{dz}{dx} + z)$$

$$2y + 2z \frac{dz}{dy} = 5xz + 5xy \frac{dz}{dy}$$

$$2x + 2z \frac{dz}{dx} = 5y(x \frac{dz}{dx} + 5yz)$$

$$\frac{dz}{dy}(2z - 5xy) = 5xz - 2y$$

$$2x + 2z \frac{dz}{dx} = 5yx \frac{dz}{dx} + 25y^2 z$$

$$\frac{dz}{dy} = \frac{5xz - 2y}{2z - 5xy}$$

$$\frac{dz}{dx}(2z - 5yx) = 25y^2 z - 2x$$

$$\frac{dz}{dx} = \frac{25y^2 z - 2x}{2z - 5yx}$$