

"Quiz" for Lecture 9

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

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

and the variables are related by $x = r + 2s$ & $y = 3r + 2s$

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

$$= 3(r+2s)^2 + 2(3r+2s)^2 + 12(r+2s)(3r+2s)$$

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

$$\frac{\partial f}{\partial s} = 6(r+2s)^2 + 16(3r+2s)^2 + 8(r+2s)(3r+2s)$$

2) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $(x^2 + y^2 + z^2 = 5xyz + 1)$

$$2x + 2zz' = 5y(z + xz'); \quad z'(2z - 5yx) = 5yz - 2x$$

$$\text{wrt. } x \quad \frac{\partial z}{\partial x} = \frac{5yz - 2x}{2z - 5yx}$$

$$2y + 2zz' = 5x(z + yz');$$

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