NAME: (print!) _Niharika Kompella_   **Section:** 23

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!

$$f(r,s) = (r+2s)^2 + 2(r+2s)(3r+2s)^2 + 2(3r+2s)^3$$

$$\frac{\partial}{\partial r}(r+2s)^2 + \frac{\partial}{\partial r}2(r+2s)(3r+2s)^2 + \frac{\partial}{\partial r}2(3r+2s)^3$$

$$2(r+2s) + 2\cdot\left((3r+2s)^3 + 9(3r+2s)^2(r+2s)\right) + 10(3r+2s)^2$$

$$\frac{\partial}{\partial s}(r+2s)^2 + \frac{\partial}{\partial s}2(r+2s)(3r+2s)^2 + \frac{\partial}{\partial s}2(3r+2s)^3$$

$$4(r+2s) + 2(2(3r+2s)^3 + 6(3r+2s)^2(r+2s)) + 12(3r+2s)^2$$

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

$$\frac{\partial}{\partial x}\, x^2 + y^2 + z^2 = \frac{\partial z}{\partial x}\, 5xyz + 1$$

$$2x + z^2\frac{\partial z}{\partial x} = 5yz$$

$$z^2\frac{\partial z}{\partial x} = 5yz - 2x$$

$$\frac{\partial z}{\partial x} = \frac{5yz - 2x}{z^2}$$

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