5:

$V = xyz\ (cm^3)$ $x_0 = 75$, $y_0 = 60$, $z_0 = 40$ $dx = dy = dz = 0.2$

$f_x = yz$ $f_y = xz$ $f_z = xy$

$$dV = \frac{\partial V}{\partial x}dx + \frac{\partial V}{\partial y}dy + \frac{\partial V}{\partial z}dz = yz(0.2) + xz(0.2) + yx(0.2)$$

$$= (60)(40)(0.2) + (75)(40)(0.2) + (75)(60)(0.2) = 480 + 600 + 900 = 1980\,cm^3$$

$$\boxed{dV_{(75,60,40)} = 1980\,cm^3}$$

6: $z = e^x \sin(y)$ $x = st^2$ $y = s^2t$ $f(x) = e^x$ $g(y) = \sin(y)$

$$\frac{\partial z}{\partial s} = f(x)\frac{\partial g(y)}{\partial s} + g(y)\frac{\partial f(x)}{\partial s} = f(x)\frac{\partial g(y)}{\partial y}\frac{\partial y}{\partial s} + g(y)\frac{\partial f(x)}{\partial x}\frac{\partial x}{\partial s}$$

$$= 2e^x \cos(y)\,st^2 + \sin(y)\,e^x t^2$$

$$\boxed{\frac{\partial z}{\partial s} = 2e^{st^2}\cos(s^2t)\,st + \sin(s^2t)\,e^{st^2}t^2}$$

$$\frac{\partial z}{\partial t} = f(x)\frac{\partial g(y)}{\partial y}\frac{\partial y}{\partial t} + g(y)\frac{\partial f(x)}{\partial x}\frac{\partial x}{\partial t}$$

$$= e^x \cos(y)\,s^2 + 2\sin(y)\,e^x st$$

$$\boxed{\frac{\partial z}{\partial t} = e^{st^2}\cos(s^2t)\,s^2 + 2\sin(s^2t)\,e^{st^2}st}$$

7: $x^3 - 6xy + y^3 = 0$

$$\frac{dy}{dx} = -\frac{f_x}{f_y} = -\frac{3x^2 - 6y}{3y^2 - 6x} = -\frac{x^2 - 2y}{y^2 - 2x}$$

$$\boxed{\frac{dy}{dx} = -\frac{x^2 - 2y}{y^2 - 2x}}$$