Name: SOLUTIONS

Quiz #5 - October 14, 2008

1. Let $z = x^2y^3, x = t + s\cos(t), y = st^2$. Find $\frac{\partial z}{\partial s}$.

$$\frac{\partial z}{\partial s} = \frac{dz}{dx}\frac{dx}{ds} + \frac{dz}{dy}\frac{dy}{ds} = \boxed{2xy^3\cos t + 3x^2y^2t^2}$$

ok to sub in for x,y if ya want

2. Use the equation $\frac{dy}{dx} = -\frac{F_x}{F_y}$ to find $\frac{dy}{dx}$:

$$\sqrt{xy} = x + x^2y^2$$

$$F = x + x^2y^2 - \sqrt{xy} \qquad F_x = 1 + 2xy^2 - \frac{y}{2\sqrt{xy}}$$

$$F_y = 2x^2y - \frac{x}{2\sqrt{xy}}$$

$$\frac{dy}{dx} = -\frac{1 + 2xy^2 - y/2\sqrt{xy}}{2x^2y - x/2\sqrt{xy}}$$

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Quiz #5 - October 16, 2008

1. Let $f(x, y) = y^2/x$. Find the maximum rate of change of f at the point $(2, 4)$ and find the direction in which it occurs.

$$\nabla f = \left(\frac{-y^2}{x^2}, \frac{2y}{x}\right), \text{ @ } \nabla f(2,4) = \boxed{\langle -4, 4\rangle \leftarrow \text{direction}}$$

$$\text{max rate} = \sqrt{4^2 + 4^2} = \boxed{\sqrt{32} = 4\sqrt{2}}$$

2. Let $f(x, y, z) = x^2y + yz + xz$. Find ∇f.

$$\nabla f = \langle 2xy + z, x^2 + z, y + x \rangle$$