

**Quiz #05 – MATH 2421**  
Spring 2008

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Name : \_\_\_\_\_

Directions: YOU MAY USE A CALCULATOR FOR THIS QUIZ. No books or notes. Show algebra. Be sure to highlight your final answer!

1. Suppose we have the following:

$$z = f(x, y) = \frac{y}{x^2}$$

- (a) [1 *pt.*] Evaluate  $f(2, 20)$ .

- (b) [2 *pts.*] Evaluate the total differential

$$dz = f_x dx + f_y dy.$$

- (c) [1 *pts.*] Estimate the value of  $\Delta z$  using  $dz$  when  $x$  moves from 2.00 to 2.04 AND  $y$  moves from 20.00 to 19.98.

(#2) [2 pts.] Suppose  $w = f(x, y)$  and both  $x$  and  $y$  depend on  $s$  and  $t$ :

$$x = x(s, t)$$

$$y = y(s, t)$$

Also, suppose  $s$  and  $t$  depend on  $\theta$ :

$$s = s(\theta)$$

$$t = t(\theta)$$

Thus, after substituting,  $w$  ultimately depends on  $\theta$ .

Write down the Multivariable Chain Rule for  $\frac{\partial w}{\partial \theta}$ . [Hint: Sum of products.]

(#3) [4 pts.] The Implicit Derivative formula for the 3-variable surface  $F(x, y, z) = 0$  is

$$\frac{\partial y}{\partial x} = - \left( \frac{F_x}{F_y} \right).$$

If we have the surface  $xy^2 + xz + x^2 \cos(xz) = 3 + \pi$ , then evaluate

$$\frac{\partial z}{\partial y} \text{ when } x = 1, y = 2, \text{ and } z = \pi.$$