Math 75B Quiz 3 (green) $/20$ Name: _____

Fall 2008

§§11-A, 11-B (E), 2.7 (S)

Please read directions carefully. Raise your hand if you are not sure what a problem is asking.

You must explain your work thoroughly and unambiguously to receive full credit on questions or parts of questions designated as **Work and Answer**.

No calculators or notes are allowed on this quiz.

Please note that there is a problem on the back.

Multiple Choice. (6 points) *Circle the letter of the best answer.*

1. If the radius r of a circular pond is decreasing at a rate of 3 cm per day, the equation that best describes this information is

   (a) $\dfrac{dr}{dt} = 3$ (c) $r = 3$

   (b) $\dfrac{dr}{dt} = -3$ (d) $r = -3$

2. If $V^2 = 4\pi s^3$ and V and s are functions of t, then

   (a) $2V = 12\pi s^2$

   (b) $2V \dfrac{dV}{ds} = 12\pi s^2 \dfrac{dV}{ds}$

   (c) $2V \dfrac{dt}{dV} = 12\pi s^2 \dfrac{dt}{ds}$

   (d) $2V \dfrac{dV}{dt} = 12\pi s^2 \dfrac{ds}{dt}$

Fill-In. (8 points) Read the following problem and answer the questions. *You do not have to solve the problem.*

A 25-foot ladder is leaning against a wall, as shown. The top of the ladder slides down the wall at a rate of 2 ft./s. How fast is the bottom of the ladder sliding away from the wall at the moment it is 8 ft. from the wall?
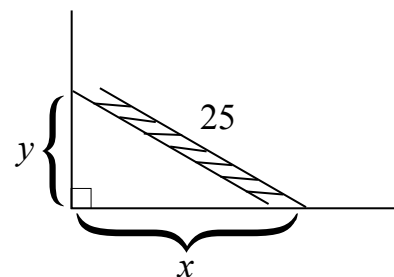

1. An equation to describe the relationship between the quantities x and y is _____.

2. The derivative of the above equation with respect to t is _____.

over for more fun!

Work and Answer. (6 points) *You must show all relevant work to receive full credit.*

A plumber wants to find out how fast a cone-shaped tank is leaking (see figure at right). She measures and finds that the radius of the surface of the water decreases at a rate of 10 cm per day. She knows that when the radius is r, the volume of water in the tank is $V = \frac{1}{3}\pi r^3$, and therefore
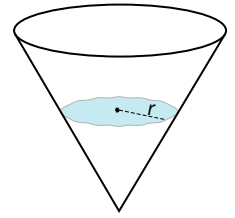
$$\frac{dV}{dt} = \pi r^2 \frac{dr}{dt}.$$

(a) When the radius is 40 cm, what is the rate of change of the volume? *Be sure to give units on your answer.*

(b) Explain why the answer in part (a) comes out (or should come out!) positive or negative.