Name: _____

Math 103 Worksheet #8: Related Rates

1. A pebble is dropped into a calm pond, causing ripples in the form of concentric circles. The radius r of the out ripple is increasing at a constant race of 1 foot per second. When the radius is 4 feet, at what rate is the total area A of the disturbed water changing?

2. A ladder 25 feet long is leaning against the wall of a house. The base of the ladder is pulled away from the wall at a rate of 2 feet per second. How fast is the top of the ladder moving down the wall when the base of the ladder is 7 feet, 15 feet, and 24 feet away from the wall?

3. Air is being pumped into a spherical balloon at a rate of 4.5 cubic feet per minute. Find the rate of change of the radius when the radius of the balloon is 2 feet.

4. All edges of a cube are expanding at a rate of 3 centimeters per second. Determine how fast the surface area is changing when each edge is (a) 1 centimeter (b) 10 centimeters?

5. A conical tank (with vertex down) is 10 feet across the top and 12 feet deep. If water is flowing into the tank at a rate of 10 cubic feet per minute, find the rate of change of the depth of the water when the water is 8 feet deep. ($V = \frac{1}{3}\pi r^2 h$)

ANSWERS: 1. $\frac{dA}{dt} = 8\pi$ ft^2/sec 2. $-\frac{7}{12}, -\frac{3}{2}, -\frac{48}{7}$ ft/sec 3. $\frac{dr}{dt} = 0.09$ft/min 4. (a) 36 cm^2/sec (b) 360 cm^2/sec 5. $\frac{dh}{dt} = \frac{9}{10\pi} = 2.82$ ft/sec