Math Xb Spring 2004

Lab 2: Related Rates

February 19, 2004

Name _____

Section Instructor _____

Collaborators _____

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1. Two concentric circles are expanding, the outer radius at a rate of 2 feet per second and the inner one at a radius of 5 feet per second. At a certain instant, the outer radius is 10 feet, and the inner radius is 3 feet. At this instant, is the area of the ring between the two circles increasing or decreasing? Justify your answer.

2. A baseball diamond is a square with side 90 feet. The corners of the square are labeled home plate, first base, second base, and third base as one moves around the square counter-clockwise. A batter hits the ball and runs from home plate towards first base with a speed of 24 feet per second.

   (a) At what rate is his distance from second base changing when he is halfway to first base?

(b) At what rate is his distance from third base changing at the same moment?

3. Water is leaking out of an inverted conical tank at a rate of 10,000 cubic centimeters per minute at the same time that water is being pumped into the tank at a constant rate. The tank has height 6 meters and the diameter at the top is 4 meters. If the water level is rising at a rate of 20 centimeters per minute when the height of the water is 2 meters, find the rate at which water is being pumped into the tank.