2.7 Related Rates

**Guidelines for Solving Related Rate Problems:**

1.

2.

3.

4.

**Examples: Solving Related Rates**

The variables x and y are both differentiable function of t and are related by the equation . Find   
 when given that when .

A pebble is dropped into a calm pond, causing ripples in the form of concentric circles. The radius of the outer ripple is increasing at a constant rate of 0.5 foot per second. When the radius is 3 feet at what rate is the total area of the disturbed water changing?

Air is being pumped into a spherical balloon at a rate of 6 cubic feet per minute. Find the rate of change of the radius when the radius is 2 feet.

An airplane is flying on a flight path that will take it directly over a radar tracking station. The airplane is flying at an altitude of 5 miles, miles from the station. The distance is decreasing at a rate of 360 miles per hour when . What is the speed of the plane?

A flag is raised while a person watched at a distance of 15 feet from the flag pole. The flag is being raised at a constant rate of 7 inches per second. Assume that the flag starts out at a height that is equivalent to the onlooker’s eye level. Find the rate of change in the angle of elevation from the onlooker’s eye level 10 seconds after the flag begins to rise.