

Related Rates

1. Assume that  $x$  and  $y$  are both differentiable functions of  $t$  and find the required values of  $dy/dt$  and  $dx/dt$ .

(similar to p.187 #4)

$$x^2 + y^2 = 5$$

*Find*

*Given*

(a)  $\frac{dy}{dt}$  when  $x = 2, y = 1$        $\frac{dx}{dt} = 5$

(b)  $\frac{dx}{dt}$  when  $x = 1, y = 2$        $\frac{dy}{dt} = -3$

2. Find the rate of change of the distance between the origin and a moving point on the graph of  $y = \cos x$  if  $dx/dt = 5$  centimeters per second.

(similar to p.187 #12)

3. The radius  $r$  of a sphere is increasing at a rate of 5 inches per minute.

(Formula:  $V = 4/3\pi r^3$ )

Find the rates of change of the volume when  $r = 10$  inches and  $r = 20$  inches

(similar to p.187 #16)

4. All edges of a cube are expanding at a rate of 4 centimeters per second. How fast is the volume changing when each edge is

(a) 2 centimeters and (b) 20 centimeters

(similar to p.187 #18) NEXT TIME SPRING 2013

5. The formula for the volume of a cone is  $V = 1/3\pi r^2 h$ . Find the rates of change of the volume if  $dr/dt$  is 4 inches per minute and  $h = 6r$  when (a)  $r = 3$  inches and (b)  $r =$

12 inches

(similar to p.187 #20)

6. A 10 m plank (that is originally laying flat on the ground) is pulled up the side of a building by means of a rope tied to the end closest to the building. It is pulled up at a rate of 0.25 meters per second. How fast is the end of the plank on the ground moving along the ground when it is 3 meters from the wall of the building?  
(similar to p.188 #26)