Math 1300-005 - Spring 2017

Related Rates, Pt. I - 2/28/17

Guidelines: Please work in groups of two or three. This will not be handed in, but is a study resource for Midterm 3. This first worksheet over related rates covers some easier examples so we can get used to the process.

1. Each side of a square is increasing at a rate of 5 cm/s. At what rate is the area of the square increasing when the area of the square is 16 cm^2.

2. The length of a rectangle is increasing at a rate of 8 cm/s and its width is increasing at a rate of 3 cm/s. When the length is 20 cm and the width is 10 cm, how fast is the area of the rectangle increasing?

3. A cylindrical tank with radius 5 m is being filled with water at a rate of 3 m^3/min. How fast is the height of the water increasing? For a cylinder, $V = \pi r^2 h$.

4. The radius of a sphere is increasing at a rate of 4 mm/s. How fast is the volume increasing when the diameter is 80 mm?

5. Suppose $y = \sqrt{2x+1}$, where x and y are functions of t.

   (a) If $dx/dt = 3$, find dy/dt when $x = 4$.

   (b) If $dy/dt = 5$, find dx/dt when $y = 5$.

6. If $x^2 + y^2 = 25$ and $dy/dt = 6$, find dx/dt when $y = 4$.

7. If $x^2 + y^2 = r^2$ and if $dx/dt = 2$ and $dy/dt = 3$, find dr/dt when $x = 5$ and $y = 12$.

8. A partical moves along the curve $y = \sqrt{1+x^3}$. As it reaches the point $(2, 3)$ the y-coordinate is increasing at a rate of 4 cm/s. How fast is the x-coordinate of the point changing at that instant?