Implicit Differentiation

1. Assume that y is a function of x. Find $\frac{dy}{dx}$ in the following:

   (a) $x^3 + y^3 = 8$

   (b) $y = x^2 y^3 + x^3 y^2$

   (c) $y = \sin(2x + 5y)$

   (d) $e^{xy} = e^{3x} - e^{4y}$

2. Let C be the graph of a circle centered at $(1, 0)$.

   (a) Write down the equation of the circle C that you are working with.

   (b) Find the equation of line tangent to C at $x = 2$.

   (c) Find the point that the above line crosses the x-axis.

3. A latter is 10 feet long and leaning against a wall with its base x feet away from the base of the wall.

   (a) Draw a picture of the situation described above and label y as the vertical distance from the tip of the latter to the floor.

   (b) Find a relationship between x and y.

   (c) Find the rate that the vertical distance is moving as you change the horizontal distance.