1. Find dy/dx by implicit differentiation.

$$y \cos x = x^2 + y^2$$

2. Consider the equation

$$\sqrt{x} + \sqrt{y} = 1 \qquad (*)$$

(a) Find y' by implicit differentiation.

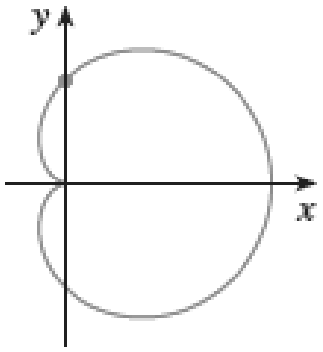
(b) Solve $(*)$ explicitly for y and differentiate to get y' in terms of x.

(c) Check that your solutions in (a) and (b) are consistent.

3. (*A §3.4 question.*) For what values of r does the function $y = e^{rt}$ satisfy the differential equation $y'' - 4y' + y = 0$?

4. For the "cardiod" shown, with the equation and point given, find an equation of the tangent line.

$x^2 + y^2 = (2x^2 + 2y^2 - x)^2, \qquad (0, \frac{1}{2})$



5. If $xy + e^y = e$, find the value of y'' at the point where $x = 0$.