1. Find dy/dx by implicit differentiation.

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

2. Consider the equation

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

(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.

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

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