

## 2.6 – Implicit Differentiation, Part I

Not all mathematical relationships can be written in the explicit form  $y = f(x)$ . The method of *implicit differentiation* is used to calculate derivatives of implicitly-defined relations.

1. Consider the curve  $C$ , given by  $x^2 + 3y^2 = 1 + 3xy$ .

a. Calculate  $\frac{dy}{dx}$  for  $C$ .

b. Write equations for both tangents to  $C$  for  $x = 1$ .

2. Find an equation for the line tangent to the curve  $x \sin(2y) + e^{xy} = 2$  at  $x = 1$ .

3. Find  $\frac{d^2y}{dx^2}$  for the curve defined by  $4x^2 + y^2 = 1$ .

4. Find  $\frac{d^2y}{dx^2}\bigg|_{(2,1)}$  for the curve defined by  $x^3 + 3x^2y^2 = 20$ .