

## Implicit Differentiation

## HW 2-12

Find  $\frac{dy}{dx}$ .

1)  $x^2 + y^2 = 1$

2)  $y^2 = x^2 + 2x$

3)  $x + \tan(xy) = 0$

4)  $4x^2 = 2y^3 + 4y$

5)  $2x^3 = (3xy + 1)^2$

6)  $y^2 = \frac{x^2 - 4}{x^2 + 4}$

Use implicit differentiation to find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$ .

7)  $4y^2 = -2 + 3x^2$

8)  $5 = 4x^2 + 5y^2$

9) Given  $2xy - y^2 = 3y^4$ , find the value of  $\frac{dy}{dx}$  at the point  $(3, 1)$ .

10) Given  $3x^2 - xy^3 = 6x$ , find the value of  $\frac{dy}{dx}$  at the point  $(-2, -1)$ .

11) Given  $x^2 + y^2 = 8$ , find the value(s) of  $\frac{dy}{dx}$  at  $x = 2$ .

12) Given  $6x^2 + 3xy + 2y^2 + 17y - 6 = 0$ , find the equations of the normal and tangent lines that pass through  $(-2, 1)$ .

13) Given  $2xy + \pi \sin y = 0$ , find the equations of the normal and tangent lines that pass through  $(0, \pi)$ .