

## 2.5 Implicit Differentiation

Implicit

vs.

Explicit

$$xy = 1$$

$$x^2 + y^2 = 9$$

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

$$y = \frac{1}{x}$$

$$y = \pm \sqrt{9 - x^2}$$

Steps for ID:

- 1) Differentiate both sides of equation with respect to  $x$
- 2) Collect all  $\frac{dy}{dx}$  terms to one side
- 3) Factor out  $\frac{dy}{dx}$
- 4) Solve by dividing by factor not containing  $\frac{dy}{dx}$

Preview:

(chain rule)

$$1) \frac{d}{dx} [x^3] = 3x^2$$

variables agree ☺

$$2) \frac{d}{dx} [y^3] = 3y^2 \cdot \frac{dy}{dx}$$

disagree