

### 3.3 Day 3

Thursday, September 5, 2019 8:26 AM

## Higher Order Derivatives

given  $y$  is a function of  $x$

$$y' = \frac{dy}{dx} \Rightarrow 1^{\text{st}} \text{ derivative}$$

$$y'' = \frac{d^2y}{dx^2} \Rightarrow 2^{\text{nd}} \text{ derivative}$$

$$y''' = \frac{d^3y}{dx^3} \Rightarrow 3^{\text{rd}} \text{ derivative}$$

$$y^n = \frac{d^n y}{dx^n} \Rightarrow n^{\text{th}} \text{ derivative}$$

Ex: Find the first 4 derivatives and use the proper notation to indicate the derivative.

$$y = \frac{1}{2}x^6 - \frac{3}{x^2} + 5x$$

$$y' = \frac{dy}{dx} = 3x^5 + 6x^{-3} + 5$$

$$y'' = \frac{d^2 y}{dx^2} = 15x^4 - 18x^{-4}$$

$$y''' = \frac{d^3 y}{dx^3} = 60x^3 + 72x^{-5}$$

$$y^{(4)} = \frac{d^4 y}{dx^4} = 180x^2 - 360x^{-6}$$