

## Exponential and Logarithmic HW #1

1. Evaluate  $e^{-3\ln 2}$

$$= e^{\ln 2^{-3}}$$

$$= 2^{-3}$$

$$= \frac{1}{8}$$

2. Find the exact solution of the equation  $e^{2+3x} = 9$ .

$$2 + 3x = \ln 9$$

$$x = \frac{\ln 9 - 2}{3}$$

3. Differentiate with respect to  $x$ .

a)  $y = x^3 \ln(x^2 + 5x - 6)$

$$\frac{dy}{dx} = (3x^2)(\ln x^2 + 5x - 6) + x^3 \left( \frac{1}{x^2 + 5x - 6} \right) (2x + 5)$$

$$= x^2 \left[ 3 \ln x^2 + 5x - 6 + \frac{2x^2 + 5x}{x^2 + 5x - 6} \right]$$

$$b) y = e^{\sec x^2}$$

$$\frac{dy}{dx} = (e^{\sec x^2}) (\sec x^2 \tan x^2) (2x)$$

$$= 2x e^{\sec x^2} \sec x^2 \tan x^2$$

$$c) y = \frac{e^{2x}}{x^2 + 1}$$

$$\frac{dy}{dx} = \frac{(e^{2x})(2)(x^2 + 1) - e^{2x}(2x)}{(x^2 + 1)^2}$$

$$= \frac{2e^{2x} [x^2 + 1 - x]}{(x^2 + 1)^2}$$

$$= \frac{2e^{2x} (x^2 - x + 1)}{(x^2 + 1)^2}$$