

Assignment 8

36 $\ln x + \ln(x+1) = \ln 2 + A = 0$

$$\ln [x(x+1)] = \ln 2$$

$$\exp [\ln(x(x+1))] = \exp(\ln 2)$$

$$x(x+1) = 2$$

$$x^2 + x = 2$$

$$x^2 + x - 2 = 0$$

$$x^2 + x - 2 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

29

$$x = \frac{-1 \pm \sqrt{1+8}}{2}$$

$$= \frac{-1 \pm 3}{2}$$

2

$$x = 1 \quad \text{or} \quad x = -2$$

8/1

$$2.9) \ln \left(\frac{x-1}{x^3} \right)$$

$$= \frac{x^3}{x-1} \frac{d}{dx} \left(\frac{x-1}{x^3} \right)$$

$$= \frac{\frac{d}{dx} (x-1)x^3 - (x-1) \frac{d}{dx} (x^3)}{(x^3)^2} x^3$$

$$= \frac{\left[\frac{d}{dx} (x) + \frac{d}{dx} (-1) \right] x^3 - 3x^2 (x-1)}{(x-1)x^3}$$

$$= \frac{x^3 - 3(x-1)x^2}{(x-1)x^3}$$

Simplifying

$$= - \frac{2x - 3}{(x-1)x}$$

8/1

$$b) \ln \left(\frac{x-1}{x^2} \right)$$

$$= \ln(x-1) - \ln x^2$$

$$\frac{d}{dx} \ln(x-1)$$

$$= \frac{1}{x-1} \frac{d}{dx} (x-1)$$

$$= \frac{\frac{d}{dx}(x) + \frac{d}{dx}(-1)}{x-1}$$

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

$$\ln(x^3)$$

$$= \frac{d}{dx} [3 \ln(x)]$$

$$= 3 \cdot \frac{1}{x}$$

$$= \frac{3}{x}$$

$$= \frac{1}{x-1} - \frac{3}{x} = \frac{x - 3(x-1)}{x(x-1)}$$

$$= - \frac{2x-3}{x(x-1)}$$

c. Turning point

$$t = \frac{1}{b}$$

$$f(t) = y = Ate^{-bt}$$

$$f\left(\frac{1}{b}\right) = A\left(\frac{1}{b}\right)e^{-b \cdot \frac{1}{b}}$$

$$= \frac{A}{b} e^{-1}$$

$$= \frac{A}{be}$$

Point of Inflection

$$t = \frac{2}{b}$$

$$f\left(\frac{2}{b}\right) = A\left(\frac{2}{b}\right)e^{-b \cdot \frac{2}{b}}$$

$$= \frac{2A}{b} e^{-2}$$

$$= \frac{2A}{be^2}$$

4B

$$y = 6x(x-2)$$

$$b = -3$$

$$y = -3x(x-2)$$

$$y = -3x^2 + 6x$$

$$\frac{dy}{dx} = -6x + 6$$

$$y = mx + c$$

$$m = \text{gradient}$$

$$\text{gradient} = -6$$

given

$$(0,0) \quad (x,y)$$

$$\text{Gradient} = \frac{\Delta y}{\Delta x}$$

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

$$\frac{y}{x} = -6$$

Equation of line

$$y = -6x + c$$

when at (0,0)

$$c = 0$$

$$y = -6x$$

$$x = \frac{y}{-6}$$