

MATH 113 - QUIZ 4 - 19 FEBRUARY 2007

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (2 pts. each) Find the derivative of each of the following functions.

(a) $g(t) = t^2 + 3t$

$$g'(t) = 2t + 3 //$$

(b) $f(x) = 6x + 1 + \frac{4}{x^2} = 6x + 1 + 4x^{-2}$

$$\begin{aligned} f'(x) &= 6 + 0 + 4(-2)x^{-3} \\ &= 6 - \frac{8}{x^3} // \end{aligned}$$

(c) $y = \sqrt{t} + \frac{1}{\sqrt{t}} = t^{1/2} + t^{-1/2}$

$$\begin{aligned} \frac{dy}{dx} &= \frac{1}{2}t^{-1/2} - \frac{1}{2}t^{-3/2} // \\ &= \frac{1}{2t^{1/2}} - \frac{1}{2t^{3/2}} // \end{aligned}$$

2. (2 pts.) Use the product rule to find $\frac{dy}{dx}$ when $y = x^2 e^x$.

$$\begin{aligned} \frac{dy}{dx} &= x^2 \frac{d}{dx}(e^x) + e^x \cdot \frac{d}{dx}(x^2) \\ &= x^2 e^x + 2x e^x \\ &= x e^x (x+2) // \end{aligned}$$

3. (2 pts.) Use the quotient rule to find $f'(x)$ when $f(x) = \frac{x}{x-1}$.

$$\begin{aligned} f'(x) &= \frac{(x-1)\frac{d}{dx}(x) - x\frac{d}{dx}(x-1)}{(x-1)^2} \\ &= \frac{(x-1)(1) - x(1)}{(x-1)^2} = \frac{-1}{(x-1)^2} // \end{aligned}$$