Solutions

MATH 122: QUIZ 6 CHAPTER 3

Name: _____

1. (5 points) Let $f(x)$ and $g(x)$ be differentiable functions. Fill in the blanks with the derivative or correct derivative rule (a and n are constants):

(i) $\frac{d}{dx}(af(x)) =$ $af'(x)$

(ii) $\frac{d}{dx}(f(x)+g(x)) =$ $f'(x)+g'(x)$

(iii) $\frac{d}{dx}(x^n) =$ nx^{n-1}

(iv) $\frac{d}{dx}\ln(x) =$ $1/x$

(v) $\frac{d}{dx}e^x =$ e^x

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2. (5 points) Differentiate the following:

(a)

$$f(x) = x\ln(x)$$

Product Rule

$$f'(x) = \ln x + x \cdot \frac{1}{x}$$

$$= \boxed{\ln x + 1}$$

(b)

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

Quotient Rule

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

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

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

OR Product & Chain Rules

$$h(x) = (x+1)(x-1)^{-1}$$

$$h'(x) = 1(x-1)^{-1} + (x+1)(-1(x-1)^{-2}\cdot 1)$$

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