

**Quiz # 4 for MA 113 - Calculus I**

02/18/2010

This quiz is intended to help you prepare for the exams. Thus, you should attempt all questions and write their answers (including your explanations) in the space provided.

This quiz will not be collected or graded.

1. Find the derivative of  $h(x) = (2x^3 + e^x)(x^4 - 3x)$ .

First remember the product rule which says that

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)].$$

If we set  $f(x) = 2x^3 + e^x$  and  $g(x) = x^4 - 3x$ , then  $f'(x) = 6x^2 + e^x$  and  $g'(x) = 4x^3 - 3$ .

$$\begin{aligned} \text{Thus } h'(x) &= (2x^3 + e^x)(4x^3 - 3) + (x^4 - 3x)(6x^2 + e^x) \\ &= 8x^6 - 6x^3 + 4x^3e^x - 3e^x + 6x^6 + x^4e^x - 18x^3 - 3xe^x \\ &= 14x^6 - 24x^3 + e^x(x^4 + 4x^3 - 3x - 3) \end{aligned}$$

2. Find the derivative of  $h(x) = \frac{5x^2}{2x^4+5}$ .

First remember the quotient rule which says that

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}[f(x)] - f(x)\frac{d}{dx}[g(x)]}{[g(x)]^2}.$$

If we set  $f(x) = 5x^2$  and  $g(x) = 2x^4 + 5$ , then  $f'(x) = 10x$  and  $g'(x) = 8x^3$ . Thus

$$\begin{aligned} h'(x) &= \frac{(2x^4 + 5)(10x) - (5x^2)(8x^3)}{(2x^4 + 5)^2} \\ &= \frac{20x^5 + 50x - 40x^5}{(2x^4 + 5)^2} \\ &= \frac{-20x^5 + 50x}{(2x^4 + 5)^2} \end{aligned}$$