

Quiz 3A, Business Calculus

Fall 2012

Name: Key

For all questions, use the shortcut rules for taking derivatives. You do not need to use the limit definition (the four-step process) for any questions on this quiz.

NO CALCULATORS are allowed on this quiz.

1. (3 points) Find $f'(x)$ if $f(x) = (2x^3 - 5)(x^7 + 2)$. Simplify your answer.

$$f'(x) = (6x^2)(x^7 + 2) + 7x^6(2x^3 - 5) \checkmark \checkmark \quad \text{Product Rule}$$

$$= 6x^9 + 12x^2 + 14x^9 - 35x^6 \checkmark$$

$$\boxed{20x^9 - 35x^6 + 12x^2}$$

$$\text{or } x^2(20x^7 - 35x^4 + 12)$$

2. (4 points) Find $f'(x)$ if $f(x) = \frac{7x^4 + 3x + \sqrt{x}}{x^2}$. Simplify your answer.

$$= \frac{7x^4}{x^2} + \frac{3x}{x^2} + \frac{\sqrt{x}}{x^2} \checkmark$$

$$f(x) = 7x^2 + 3x^{-1} + x^{-3/2} \checkmark$$

$$f'(x) = 14x - 3x^{-2} - \frac{3}{2}x^{-5/2} \checkmark \checkmark$$

$$\text{or } \frac{x^2(28x^3 + 3 + \frac{1}{2}x^{-1/2}) - 2x(7x^4 + 3x + \sqrt{x})}{(x^2)^2} \checkmark \checkmark \checkmark$$

$$= \frac{x \left[(28x^4 + 3x + \frac{1}{2}x^{1/2}) - (14x^4 + 6x + 2\sqrt{x}) \right]}{x^4} \checkmark$$

$$= \frac{14x^4 - 3x - \frac{3}{2}x^{1/2}}{x^3}$$

3. (3 points) Find the equation for the tangent line to the curve $f(x) = (3x^2 - 2x + 1)^6$ at the point $(0, 1)$.

$$f'(x) = 6(3x^2 - 2x + 1)^5 (6x - 2) \checkmark$$

$$f'(0) = 6 \cdot (1)^5 \cdot (-2) = -12$$

$$y - 1 = (-12)(x - 0) \checkmark$$

$$y = -12x + 1$$

Quiz 3B, Business Calculus

Fall 2012

Name: Key

7:59
8:02
3

For all questions, use the shortcut rules for taking derivatives. You do not need to use the limit definition (the four-step process) for any questions on this quiz.

NO CALCULATORS are allowed on this quiz.

1. (4 points) Find $f'(x)$ if $f(x) = \frac{x^7 + 2x^3 + \sqrt{x}}{x^4}$. Simplify your answer.

$$f(x) = \frac{x^7}{x^4} + \frac{2x^3}{x^4} + \frac{x^{1/2}}{x^4}$$

$$f(x) = x^3 + 2x^{-1} + x^{-7/2}$$

$$f'(x) = 3x^2 - 2x^{-2} - \frac{7}{2}x^{-9/2}$$

Quotient Rule: $\frac{x^4(7x^6 + 6x^2 + \frac{1}{2}x^{-1/2}) - (x^7 + 2x^3 + \sqrt{x}) \cdot 4x^3}{x^8}$

$$= \frac{x^3(7x^7 + 6x^3 + \frac{1}{2}x^{1/2} - 4x^7 - 8x^3 - 4x^{1/2})}{x^8}$$

$$= \frac{3x^7 - 2x^3 - \frac{7}{2}x^{1/2}}{x^5}$$

2. (3 points) Find the equation for the tangent line to the curve $f(x) = (2x^4 + 3x - 2)^4$ at the point $(0, 2)$.

Typo
(0, 16)
X

$$f'(x) = 4(2x^4 + 3x - 2)^3(8x^3 + 3) \quad \checkmark \quad \text{Chain Rule}$$

$$f'(0) = 4(-8)(3) = -96$$

$$y - 2 = -96(x - 0)$$

$$y = -96x + 2$$

$$\Rightarrow \text{[scribbled out equation]}$$

full credit,
but wrong
b/c of my typo.

or

$$y = -96x + 16 \quad \leftarrow \text{correct}$$

3. (3 points) Find $f'(x)$ if $f(x) = (3x^4 + 4)(x^5 - 1)$. Simplify your answer.

$$f'(x) = 12x^3(x^5 - 1) + 5x^4(3x^4 + 4) \quad \checkmark \quad \text{Product Rule}$$

$$= 12x^8 - 12x^3 + 15x^8 + 20x^4$$

$$f'(x) = 27x^8 + 20x^4 - 12x^3$$