

# Quiz 3A, Business Calculus

Fall 2014 - Dr. Graham-Squire

Name: Key

10:31  
10:35  
4  
⇒ 15 min.

1. (4 points) Let  $f(x) = \frac{x^2 + 20}{x + 4}$ . Find all values of  $x$  where the tangent line will be horizontal.

$$f'(x) = \frac{(x+4)(2x) - (1)(x^2+20)}{(x+4)^2} \quad \checkmark$$

$$f'(x) = \frac{2x^2 + 8x - x^2 - 20}{(x+4)^2}$$

$$f'(x) = \frac{x^2 + 8x - 20}{(x+4)^2} \quad \checkmark$$

for horizontal tangent line, need ~~to set~~  $f'(x) = 0$  ✓

$$\Rightarrow x^2 + 8x - 20 = 0$$

$$(x+10)(x-2) = 0$$

$$\Rightarrow \boxed{x = -10 \quad \text{or} \quad x = 2} \quad \checkmark$$

2. (3 points) Calculate  $\frac{d}{dx} \left( \frac{2}{(x^3-4)^5} \right)$ . Simplify your answer, if possible.



$$= \frac{d}{dx} (2(x^3-4)^{-5}) \quad \checkmark$$

$$= 2(-5)(x^3-4)^{-6} \cdot 3x^2 \quad \checkmark$$

$$= \cancel{2(-5)} \boxed{-30x^2(x^3-4)^{-6}} \quad \checkmark \Rightarrow \approx \frac{-30x^2}{(x^3-4)^6}$$

or

$$\frac{(x^3-4)^5 \cdot 0 - 2 \cdot 5(x^3-4)^4 \cdot (3x^2)}{((x^3-4)^5)^2} = \frac{-30x^2(x^3-4)^4}{(x^3-4)^{10} \cdot 6} \quad \checkmark$$

$$= \frac{-30x^2}{(x^3-4)^6} \quad \checkmark$$

3. (3 points) Let  $f(x) = (3x^7 - 2x + 4)^8 \sqrt{x^5 + 1}$ . Find  $f'(x)$ . You do NOT need to simplify your answer.

$$f(x) = (3x^7 - 2x + 4)^8 (x^5 + 1)^{1/2}$$

$$f'(x) = \boxed{8(3x^7 - 2x + 4)^7 (21x^6 - 2)(x^5 + 1)^{1/2} + (3x^7 - 2x + 4)^8 \cdot \frac{1}{2}(x^5 + 1)^{-1/2} \cdot 5x^4} \quad \checkmark$$

$$= \boxed{8(3x^7 - 2x + 4)^7 (21x^6 - 2)(x^5 + 1)^{1/2} + (3x^7 - 2x + 4)^8 \cdot \frac{5}{2}(x^4)(x^5 + 1)^{-1/2}} \quad \checkmark$$