

NAME: Solution Key / Grading Key Panther ID: \_\_\_\_\_

Quiz 2 - MAC 2311, Spring 2016

To receive credit you MUST SHOW ALL YOUR WORK. Answers which are not supported by work will not be considered.

1. (2 pts) Fill in below the definition with limit of the derivative. Be precise.

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

2. (6 pts) Find the derivative of each of the following functions. You do not have to simplify.

(a)  $f(x) = x^7 - \frac{4}{\sqrt{x}}$

$$f(x) = x^7 - 4x^{-\frac{1}{2}}$$

$$f'(x) = 7x^6 - 4 \cdot (-\frac{1}{2})x^{-\frac{3}{2}}$$

$$f'(x) = 7x^6 + 2x^{-\frac{3}{2}}$$

1pt each

(b)  $g(x) = (3x^2 + \pi^3)(5x^3 + 7)$

$$g'(x) = (3x^2 + \pi^3)'(5x^3 + 7) + (3x^2 + \pi^3)(5x^3 + 7)'$$

$$g'(x) = 6x \cdot (5x^3 + 7) + (3x^2 + \pi^3) \cdot 15x^2$$

1pt each  
0.5 pts for  $(\frac{\pi^3}{4})'$

(c)  $h(x) = \frac{x}{x^2 + 2}$

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

1pt for Q. Rule

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

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

1pt answer

3. (4 pts) Find the equation of the tangent line to the graph of  $f(x) = 2x - \frac{1}{x}$  at  $x = 1$ .

Point  $x=1, y=f(1) = 2 \cdot 1 - \frac{1}{1} = 1$  (0.5 pts)

Slope  $m = f'(1)$

$$f'(x) = (2x - \frac{1}{x})' = 2 + x^{-2} = 2 + \frac{1}{x^2}$$
 (0.5 pts)

$$m = f'(1) = 2 + \frac{1}{1^2} = 3$$
 (1pt)

Thus tangent line is

$$y - 1 = 3 \cdot (x - 1)$$
 (1pt)