NAME: Solution Key **Panther ID:** ____________

Quiz 2 - MAC 2311, Fall 2015

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.

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

2. (6 pts) Find the derivative of each of the following functions. You **don't** have to simplify.

(a) $f(x) = 5x^4 - 4\sqrt{x}$

$$f'(x) = 20x^3 - 4 \cdot \frac{1}{2} x^{-\frac{1}{2}}$$

or

$$f'(x) = 20x^3 - \frac{2}{\sqrt{x}}$$

(b) $g(x) = (3x-1)(x^3+\pi^4)$

$$g'(x) = (3x-1)' \cdot (x^3+\pi^4) + (3x-1)(x^3+\pi^4)'$$

$$g'(x) = 3 \cdot (x^3+\pi^4) + (3x-1) \cdot 3x^2$$

{Note that $(\pi^4)' = 0$ since $\pi^4 =$ constant.

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

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

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

or

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

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

The point has coordinates $x=2$, $y = f(2) = 2 - \frac{2}{2} = 1$

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

so slope of the tangent line is

$$m_{tan} = f'(2) = 1 + \frac{2}{2^2} = 1 + \frac{1}{2} = \frac{3}{2}$$

The equation of the tangent line is:

$$\boxed{y - 1 = \frac{3}{2}(x-2)} \quad \text{or} \quad \boxed{y = \frac{3}{2}x - 2}$$