Name: ——————————————————————

Math 103 Worksheet #5: Limit Definition of Derivative

1. Define *derivative.*

2. State the limit definition of a derivative.

3. Given $f(x)$, find $f'(x)$ by using the **limit definition**.

   (a) $f(x) = -4$

   (b) $f(x) = 5x + 1$

   (c) $f(x) = -3x^2 + x + 5$

   (d) $f(x) = x^3 + 2x$

(e) $f(x) = \sqrt{x}$

(f) $f(x) = \frac{2}{x}$

4. Using $f(x) = -\frac{3}{2}x^2$, predict if the slope of the tangent line will be positive or negative at $x = -3$, $x = 0$, and $x = 1$. Then find the actual slope of the tangent line at these points.

5. Given $f(x) = x^2 + 2x + 1$, find the slope of the tangent line at $x = -3$.

6. Using the information from question #4, can you find the equation of the tangent line at $x = -3$?

ANSWERS: 1. slope of tan line 2. $\lim\limits_{h \to 0} \frac{f(x+h)-f(x)}{h}$ 3a.0 b.5 c.-6x+1 d.$3x^2 + 2$ e.$\frac{1}{2\sqrt{x}}$ f.$-\frac{2}{x^2}$ 4.+,0,-;9,0,-3 5.-4 6.$y = -4x - 16$