

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**AP CALCULUS BC**  
**Derivative Worksheet 3.1**

**Use the limit definition of the derivative to find  $f'(x)$ . Show all of your work. Do not use any shortcuts for differentiation that you may have learned, except to check your answers.**

1.  $f(x) = 3x + 2$

2.  $f(x) = 2x^2 + x - 1$

3.  $f(x) = 1 - x^2$

4.  $f(x) = \sqrt{x - 4}$

5.  $f(x) = x^3$

6.  $f(x) = \frac{1}{x - 1}$

Find an equation of the tangent line to the graph of  $f$  at the indicated point. (Check your answer by graphing the graph of  $f$  and the tangent line on your calculator.)

8.  $f(x) = x^2 + 1; (2, 5)$

9.  $f(x) = x + \frac{1}{x}; (1, 2)$

10. The graph of a function,  $f(x)$  is represented at the right.

What is the value of  $\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$ ?

- (A) 0
- (B)  $\frac{1}{2}$
- (C) 1
- (D)  $1\frac{1}{2}$
- (E) DNE

