

## AP Calculus Chapter 3 Review Test 1

\*Be able to determine intervals of continuity and the definition of continuity and when a function is differentiable.

\*Know how to use product and quotient rule to find derivative of functions.

\*Know how to use nDeriv on your calculator!!

\*Review when a function is increasing/decreasing

\*Given a graph, be able to draw the derivative

1. Find the average rate of change of  $f(x) = x^2$  on  $[-1, 2]$ .
2. Use definition of derivative to find  $f'(x)$  for  $f(x) = x^2 + 3x + 2$ .
3. Consider a particle whose motion is represented by  $s(t) = 3t^2 - 2t + 1$ , where  $t \geq 0$ .
  - a) Find the equation of the velocity.
  - b) What is the acceleration equation? What is  $a(4)$ ?
  - c) Find the position at  $t = 4$ .
  - d) Find the distance travelled by the particle in the first 2 seconds.
4. Sketch a graph of a function with following properties:  
 $f(0) = 4$ ,  $f'(0) = 0$ ,  $f'(-4) = 1$ ,  $f'(4) = 0$ ,  $f(2) = -1$ ,  $f'(6) = 1$
5. Suppose at  $x = 2$ ,  $f(2) = 5$ ,  $f'(2) = 12$ ,  $g(2) = -1$ ,  $g'(2) = 3$ . Find the derivative of  $f(x) \cdot g(x)$
6. Find the tangent line to  $f(x) = \frac{x}{x^2 + 1}$  at  $(1, \frac{1}{2})$ .
7. Where does  $f(x) = x^2 + x$  have a horizontal tangent?
8. Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  for  $y = 2x \cos x$