Worksheet 2

Name: _____

Directions

- This counts as your "attendance" for the day. You must give this to me today to get credit for it.

- You may leave if you finish the packet.

- You may work in groups, and you can ask me for assistance.

- I grade this worksheet based on completion, not accuracy; however, you should strive for completely correct answers in order to make sure you understand the material.

1. Find the average rate of change of the following functions on the indicated intervals.

   (a) $f(x) = 12x^2 + 2$, interval: $[3, 4]$

   (b) $f(t) = \dfrac{2}{t}$, interval: $[1, 6]$.

2. Find the instantaneous rate of change of the functions at the indicated x-value.

   (a) The function from 1a, at $x = 2$.

   (b) The function from 1b, at $x = 3$.

3. For the function $f(x) = x^2 + 2$, find the equation of the tangent line at $x = 3$.

4. Suppose $f(x) = c$ is a constant function (meaning c is a fixed number not depending on x). Calculate $f'(x)$ from the definition. (If it makes the problem easier, you may pretend $c = 2$; your result, however, will work for any constant.)

5. In all of the preceding problems, we calculated the derivative $f'(x)$ at specific x-values. If instead we leave x unspecified as a variable, then $f'(x)$ defines a new *function*. In the following problems, calculate the derivative function for given $f(x)$.

   (a) $f(x) = \dfrac{1}{x}$

   (b) $f(x) = x^2$

6. Calculate the derivative function of $f(x) = x$.

7. Calculate the derivative function of $f(t) = \sqrt{t}$. [Hint: after setting up the difference quotient, multiply the top and bottom of the fraction by $(\sqrt{x+h} + \sqrt{x})$.]

8. A really frustrated calculus student decides to drop their copy of the textbook off of the top floor of deady. The height of the book (in feet) as a function of time (in seconds) can be modeled by

$$y(t) = -16t^2 + 70,$$

where y is the height of the book measured from the ground. What is the speed of the book when it hits the ground?