2.2 Defining the Derivative

CA #2

Calculus Name: ______________________________

Find the derivative using limits. If the equation is given as $y =$, use Leibniz Notation: $\frac{dy}{dx}$. If the equation is given as $f(x) =$, use Lagrange Notation: $f'(x)$. WRITE SMALL!!

1. $y = 2 + 10x - x^2$

2. $f(x) = \frac{1}{x+7}$

3. $y = \sqrt{6x+5}$

For each problem, create an equation of the tangent line of f at the given point.

4. $f(6) = 2$ and $f'(6) = -8$

5. $f(x) = 2x - 3x^2$
   $f'(x) = 2 - 6x; \quad x = -2$

6. $f(x) = \tan(5x)$
   $f'(x) = 5\sec^2(5x)\,; \; x = \frac{\pi}{20}$

For each problem, use the information given to identify the meaning of the two equations in the context of the problem. Write in full sentences!

7. W is the amount of water (measured in gallons) in Mr. Brust's hot tub.
   t is the number of minutes since Mr. Brust unplugged the drain for the function $W(t)$.
   $W(10) = 13$ and $W'(7) = -4.3$

8. $V(t)$ is the volume of an ice cube measured in cubic centimeters and t is the number of seconds since the ice cube was plated on a plate.
   $V(135) = 28$ and $V(1000) = -0.02$

Answers to 2.2 CA #2

1. $10 - 2x$	2. $-\frac{1}{(x+7)^2}$	3. $\frac{3}{\sqrt{6x+5}}$	4. $y - 2 = -8(x - 6)$	5. $y + 16 = 14(x + 2)$	6. $y - 1 = 10\left(x - \frac{\pi}{20}\right)$

7. After 10 minutes, there is 13 gallons of water in the tub. On the 7th minute, the water is draining at a rate of 4.3 gallons per minute.

8. After 135 seconds, the volume of the ice cube is 28 cm³. On the 1000th second, the ice cube is shrinking by 0.02 cm³/sec.