4.1 Interpreting the Meaning of the Derivative

Calculus   Name: _____

For each problem, a differentiable function is given along with a definition of the variables. Interpret the values in the context of the problem.

1. The function $P(t)$ models the population of the world, in billions of people, where t is the number of years since January 1, 1990. Interpret $P'(15) = 0.08$.

2. The rate of water flowing from a dam is modeled by $w(t)$, where w is measured in gallons per second and t is seconds. Interpret $w'(5) = 200$.

3. The rate at which the temperature is changing on a given day is modeled by $T(h)$, where T is measured in degrees per hour and h is hours. Interpret $T'(8) = 4$.

4. For $t \geq 0$ hours, H is a differentiable function of t that gives the temperature, in degrees Celsius, at a weather station on Mt. Rainier. Interpret $H'(10) = 1$.

5. The percentage grade a student receives on a test, is modeled by $G(t)$ where t is the number of hours spent studying for the test. Interpret $G'(4) = 0.5$.

6. Mr. Brust has entered a Biggest Loser contest and is hoping to lose some of those holiday calories. His rate of weight gain/loss can be modeled by $p(t)$, where p is measured in pounds per week and t is weeks since he started his diet. Interpret $p'(2) = -2$.

7. The height of a rocket is modeled by $h(t)$ meters where t is measured in seconds. Interpret $h'(20) = 500$.

8. A harbor's water depth changes with the ocean tides. The rate of change of the depth of the water is modeled by $d(t)$, where d is measured in feet per hour and t is hours. Interpret $d'(4) = 2$.

Answers to 4.1 CA #2

1. In 2005, the world's population is increasing by 80,000,000 people per year.

2. At 5 seconds, the rate of water flow is increasing by 200 gallons per sec².

3. At 8 hours, the rate of temperature change is increasing by 4 degrees per hour².

4. On the 10ᵗʰ hour, the weather is increasing at a rate of 1 degree Celsius per hour.

5. On the 4ᵗʰ hour of studying, the grade will improve by 0.5% per hour.

6. On the 2ⁿᵈ week, his rate of losing weight is increasing by 2 pounds per week.

7. On the 20ᵗʰ second, the height is changing by 500 meters per second.

8. On the 4ᵗʰ hour, the rate of change of the water depth is increasing by 2 feet per hour per hour.

Answers to 4.1 CA #2

1. In 2005, the world's population is increasing by 80,000,000 people per year.	2. At 5 seconds, the rate of water flow is increasing by 200 gallons per $\sec^2$.	3. At 8 hours, the rate of temperature change is increasing by 4 degrees per hour^2.
4. On the 10th hour, the weather is increasing at a rate of 1 degree Celsius per hour.	5. On the 4th hour of studying, the grade will improve by 0.5% per hour.	6. On the 2nd week, his rate of losing weight is increasing by 2 pounds per week per week.
7. On the 20th second, the height is changing by 500 meters per second.	8. On the 4th hour, the rate of change of the water depth is increasing by 2 feet per hour per hour.	