4.1 Interpreting the Derivative in Context

Calculus

Practice

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 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 $G'(1) = 3$.

At 1 hour of studying, the grade will improve at a rate of 3% per hour.

2. Mr. Bean rides his motor scooter to work some days. His distance from home can be modeled by $d(t)$ meters where t is measured in minutes. Interpret $d'(15) = 650$.

At 15 minutes, the distance from home is increasing at a rate of 650 meters per minute.

3. The rate at which a factory produces baseball hats each day can be modeled by $b(t)$ where $b(t)$ is the number hats produced per hour and t is the number of hours since the factory opens. Interpret $p'(1) = 100$.

At 1 hour, the rate of producing hats is increasing at a rate of 100 hats per hour per hour.

4. Mr. Brust has entered a Biggest Loser contest and is hoping to lose some of those holiday calories. His weight gain or 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 $p'(4) = -1$.

On the 4th week, the rate of weight loss is decreasing at a rate of 1 pound per week per week.

5. The number of gallons of water in a storage tank at time t, in minutes, is modeled by $w(t)$. Interpret $w'(10) = -8$.

At 10 minutes, the amount of water is decreasing at a rate of 8 gallons per minute.

6. 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 $T'(20) = -0.5$.

At 20 hours, the rate of temperature change is decreasing at a rate of 0.5 degrees per hour per hour.

7. 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 $d'(2) = -3$.

At 2 hours, the rate of change of the water depth is decreasing at a rate of 3 feet per hour per hour.

8. The height of a rocket is modeled by $h(t)$ meters where t is measured in seconds. Interpret $h'(10) = 30$.

At 10 seconds, the height is increasing at a rate of 30 meters per second.

9. The time it takes for a chemical reaction to occur can be modeled by $t(A)$, where t is the time, in minutes, and A is the catalyst used, measured in milliliters. Interpret $t'(40) = 1.7$.

When 40 milliliters of catalyst is used, the reaction is increasing at a rate of 1.7 minutes per milliliter.

10. A tire is leaking air pressure because of a small hole. The function $p(t)$ models the amount of air pressure (psi) in the tire after t minutes. Interpret $p'(3) = -2$.

At 3 minutes, the air pressure is decreasing at a rate of 2 psi per minute.