

The Derivative Function and its Interpretations

1. Let $V(t)$ be the volume, in gallons, of the water in the bathtub as a function of time in seconds.
 - (a) What are the units of $V'(t)$?
 - (b) What does $V'(t)$ indicate in practical terms?
 - (c) What does it mean if $V'(t)$ is negative?
 - (d) Sketch a possible $V(t)$ that corresponds to someone filling up the tub, taking a bath, and then draining the tub.
 - (e) Sketch a possible $V'(t)$ that corresponds to someone filling up the tub, taking a bath, and then draining the tub.
2. Let $s(t)$ be the height of a sunflower plant, in centimeters, as a function of time. Let t be measured in days since the seed germinates.
 - (a) What is the meaning of $s(12) = 78$?
 - (b) What are the units of $s'(t)$?
 - (c) What is the meaning of $s'(12) = 1.5$?
 - (d) Based on the above, estimate the value of $s(14)$.
 - (e) Sketch a possible graph for $s(t)$.
 - (f) Sketch a possible graph for $s'(t)$.
3. Let $f(r)$ give the area in cm^2 of a pizza as a function of its radius r in cm.
 - (a) Algebraically determine the derivative of $f(r)$ at $r = 8$.
 - (b) Algebraically determine the derivative of $f(r)$ as a function of r .
 - (c) What is the meaning of $f(5)$?
 - (d) What is the meaning of $f'(6)$?
 - (e) Why is $f'(6) > f'(5)$?
4. Let $g(v)$ be the fuel efficiency of a car traveling at v miles per hour. What is the practical meaning of the statement:

$$g'(55) = -0.54 ?$$