

ASSIGNMENT 1

Basic concepts of calculus

Reading: §1.1 in Strang, §0.1 in Smith-Minton

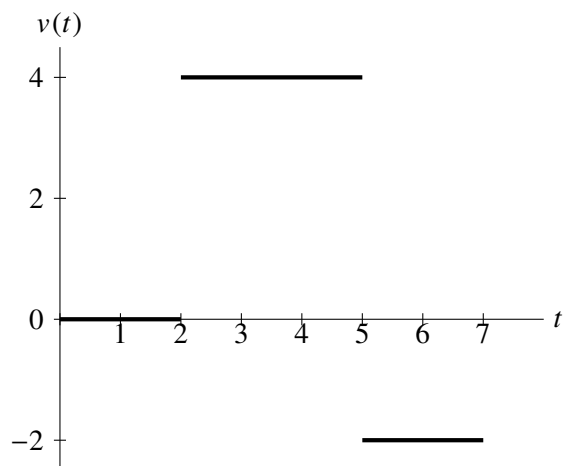
Exercise 1.1. Answer the following questions based on §1.1 of Strang.

- (1) What is the central question of calculus?
- (2) Strang introduces the words *differentiation* and *integration* that describe two processes in calculus. Describe these processes.
- (3) If the velocity function v is constant, what can we say about distance function f ?
- (4) Suppose the graph of the distance function f is a straight line. What can we say about the corresponding velocity function?

Exercise 1.2. Make plots of the following functions:

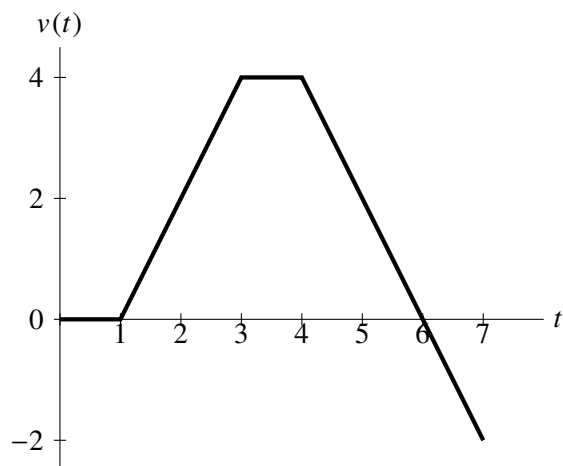
$$u(t) = \frac{1}{2}t^2 \quad v(t) = 10 - t^2 \quad w(t) = \begin{cases} 5 & \text{if } 0 < t < 2 \\ 2 & \text{if } 2 < t < 4 \end{cases}$$

Exercise 1.3. Find a formula for the function having the following graph.



Exercise 1.4. Draw a graph of the distance function f corresponding to the velocity function v depicted in Exercise 1.3. Write down a formula for $f(t)$.

Exercise 1.5. Find a formula for the function having the following graph.



Exercise 1.6. Draw a graph of the distance function f corresponding to the velocity function v depicted in Exercise 1.5. Write down a formula for $f(t)$.

Exercise 1.7. Look over problems 59–74 on page 18 of Smith-Minton. Do enough of these problems to make sure you are competent at these types of problems.