

Math 2167: Homework 8
Due: Friday, November 15th

1) Let $f'(x)$ be the slope of a mountainside trail at a distance of x (horizontal) miles from the start of the trail.

(a) What does $\int_2^6 f'(x) dx$ represent?

(b) What does $f(2) + \int_2^6 f'(x) dx$ represent?

Explain your reasoning.

2) A rocket has launched and its velocity is given in meters per second by

$$v(t) = t^2.$$

We would like to know how far the rocket traveled after 5 seconds. For this you will need to make **careful** plots.

- (a) Assuming that for each second the rocket's velocity is constant, plot a graph of the rocket's position.
- (b) Assuming that for each half second the rocket's velocity is constant, plot a graph of the rocket's position.
- (c) In each case above, you should have been using the formula:

$$\text{distance} = \text{rate} \cdot \text{time}$$

You know that multiplication can be modeled through *area*. For each plot above make an additional plot, where you visualize each

$$\text{rate} \cdot \text{time}$$

as a rectangle with time on the horizontal axis. You can then present the rocket's distance traveled as a series of (touching) rectangles. Overlay a plot of $v(t)$ on these rectangles. What do you notice?

Note, you must use graph paper, and you should have four plots in total. Be sure to give some explanation what is going on.