# 1 | Reading

## 1.1 | Definition of a Definite Integral

For each interval $[x_i, x_{i+1}]$, we choose $x_i^*$ in the interval to be the position of the minimum (for lower bound) or maximum (upper bound) value.

# 2 | Problems

## 2.1 | exr1.3

Using the left edge: -8.4375

Summation notation for left edge approximation:

$$\sum_{i=0}^{n} \underbrace{\frac{b-a}{n}}_{\text{width}} \underbrace{f\left(a + \frac{b-a}{n} i\right)}_{\text{height}}$$

## 2.2 | exr1.4 (in class)

0.21875 using the left estimate

## 2.3 | exr1.5

### 2.3.1 | left estimate

69.4 feet (add all except last number, because we are stopping at 3.0 seconds in.)

### 2.3.2 | right estimate

89.6 feet (add the last number and drop the zero from the beginning)

### 2.3.3 | middle estimate

Not enough information to do it for $\Delta x = 0.5$, so I will use $n = 3$ aka $\Delta x = 1$

$$6.2 + 14.9 + 19.4 = 40.5 \text{ feet}$$

## 2.4 | exr1.6

### 2.4.1 | $\int_0^1 \sqrt{x^2+1} dx$

$\sqrt{x^2+1}$ is the length the hypotenuse of a triangle with leg-lengths 1 and $x$. Because $x$ is continuous, this is like the area of a right triangle with leg-lengths 1 and 1.