

**5.1:** 1, 3, 5, 11, 12, 13, 15, 17, 19

**5.2:** 1, 3, 5, 7, 9, 10, 12, 17, 19, 22, 31, 32, 35, 39, 31, 43

## Chapter 5.1

**1:**

4 rectangles:

Lower estimate: left to right rectangles:

Heights: 2, 2.75, 5, 5.75

Area:  $2 * 2 + 2.75 * 2 + 5 * 2 + 5.75 * 2 = 31$

Upper estimate: right to left rectangles

Heights: 8, 5.75, 5, 2.75

Area:  $2 * 8 + 2 * 5.75 + 2 * 5 + 2 * 2.75 = 43$

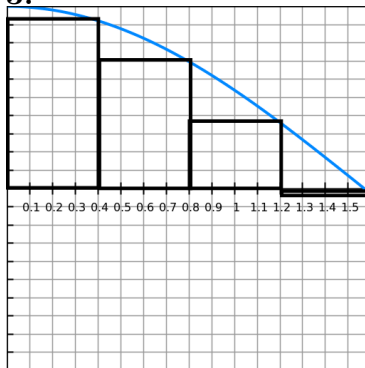
8: Lower: Heights: 2, 3, 3.75, 4.5, 5, 5.75, 5.5, 5.9, 6

Area: 41.4

Upper: Heights: 6, 5.9, 5.5, 5.75, 5, 4.5, 3.75, 3

Area: 45.4

**3:**



a: Area = 0.55

b: Area = 1.55

**5:**

$f(x) = 1 + x^2, [-1, 2]$

a:  $\Delta x \sum_{j=1}^N f(a + j\Delta x) = 8$

b:  $\Delta x \sum_{j=0}^{N-1} f(a + j\Delta x) = 5$

c:  $\Delta x \sum_{j=1}^N f(a + (j - \frac{1}{2})\Delta x) = 5.75$

Midpoint (c) seems to be the most accurate.

**11:**

Lower: 11.5667

Upper: 14.9333

**12:**

a. 25.8

b. 25.2

c. Yes. The second is the upper estimate and the first the lower.

**13:**

Lower: 7

Upper: 6.32

**15:**

Left endpoint:  $\frac{70}{6} + \frac{50}{6} + \frac{35}{6} + \frac{25}{6} + \frac{15}{6} + \frac{10}{6} = 34.1667$

Right endpoint:  $\frac{50}{6} + \frac{35}{6} + \frac{25}{6} + \frac{15}{6} + \frac{10}{6} + \frac{0}{6} = 22.5$

Avg: 28.333

**17:**

$$\Delta x = \frac{3-1}{N} = \frac{2}{N}$$

$$f(x) = \frac{2x}{x^2+1}$$

$$\lim_{N \rightarrow \infty} \Delta x \sum_{j=1}^N f(1 + j\Delta x)$$

**19:**

$$\Delta x = \frac{0-\pi/2}{N} = \frac{-\pi/2}{N}$$

$$f(x) = x \cdot \cos(x)$$

$$\lim_{N \rightarrow \infty} \Delta x \sum_{j=1}^N f(1 + j\Delta x)$$