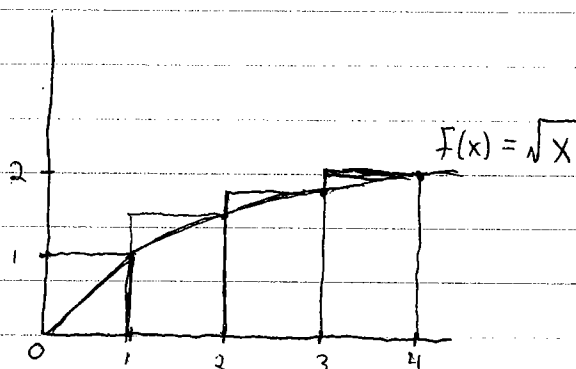


5.1 #4, 18

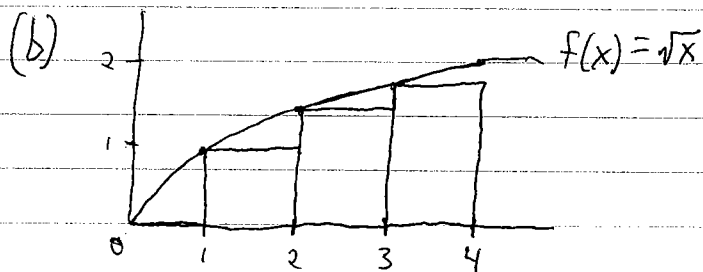
5.2 #6, 12, 18

5.1 4. (a)



$$\text{Area} \approx 1 \cdot 1 + 1 \cdot \sqrt{2} + 1 \cdot \sqrt{3} + 1 \cdot 2 \approx 6.1463$$

This is an overestimate.



$$\text{Area} \approx 1 \cdot 0 + 1 \cdot 1 + 1 \cdot \sqrt{2} + 1 \cdot \sqrt{3} \approx 4.1463$$

This is an underestimate.

$$18. \quad f(x) = 1 + x^4, \quad 2 \leq x \leq 5$$

$$\Delta x = \frac{5-2}{n} = \frac{3}{n}$$

$$x_i = 2 + \frac{3i}{n}$$

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i) \Delta x = \lim_{n \rightarrow \infty} \sum_{i=1}^n \left[\left(1 + \left(2 + \frac{3i}{n} \right)^4 \right) \cdot \frac{3}{n} \right]$$

$$5.2 \quad 6. \quad \int_{-3}^3 g(x) dx$$

Six rectangles $\Delta x = 1$

(a) Using right endpoints:

$$\int_{-3}^3 g(x) dx \approx 1 + \left(-\frac{1}{2}\right) + \left(-\frac{3}{2}\right) + \left(-\frac{3}{2}\right) + \left(-\frac{1}{2}\right) + \left(\frac{5}{2}\right) = \boxed{-\frac{1}{2}}$$

(b) Left endpoints:

$$\int_{-3}^3 g(x) dx \approx 2 + 1 + \left(-\frac{1}{2}\right) + \left(-\frac{3}{2}\right) + \left(-\frac{3}{2}\right) + \left(-\frac{1}{2}\right) = \boxed{-1}$$

(c) Midpoints:

$$\int_{-3}^3 g(x) dx \approx 1.6 + 0 + (-1) + (-1.75) + (-1.1) + (.5) = \boxed{-1.75}$$

$$12. \quad n = 4, \quad \Delta x = 1$$

$$\int_1^5 \frac{x-1}{x+1} dx \approx \frac{1.5-1}{1.5+1} + \frac{2.5-1}{2.5+1} + \frac{3.5-1}{3.5+1} + \frac{4.5-1}{4.5+1}$$

$$= \frac{1}{5} + \frac{3}{7} + \frac{5}{9} + \frac{7}{11} \approx \boxed{1.8205}$$

$$18. \quad \lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{\cos x_i}{x_i} \Delta x \quad [\pi, 2\pi]$$

$$\int_{\pi}^{2\pi} \frac{\cos x}{x} dx$$