

$$\sum_{i=1}^n c = nc$$

$$\sum_{i=1}^n i = \frac{n(n+1)}{2} = \frac{n^2 + n}{2}$$

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6} = \frac{2n^3 + 3n^2 + n}{6}$$

$$\sum_{i=1}^n i^3 = \frac{n^2(n+1)^2}{4} = \frac{n^4 + 2n^3 + n^2}{4}$$

1. Evaluate $\lim_{n \rightarrow \infty} \sum_{i=1}^n f(c_i) \Delta x_i$ over the region bounded by the graphs of $f(x) = \sqrt[3]{x}$, $y = 0$, $x = 0$, $x = 1$. Hint: Let $c_i = \frac{i^3}{n^3}$ and recall that the width of each interval is $\Delta x_i = \frac{i^3}{n^3} - \frac{(i-1)^3}{n^3}$.

2. Evaluate the definite integral by the limit definition.

$$\int_1^6 (2x^2 + 1) dx$$

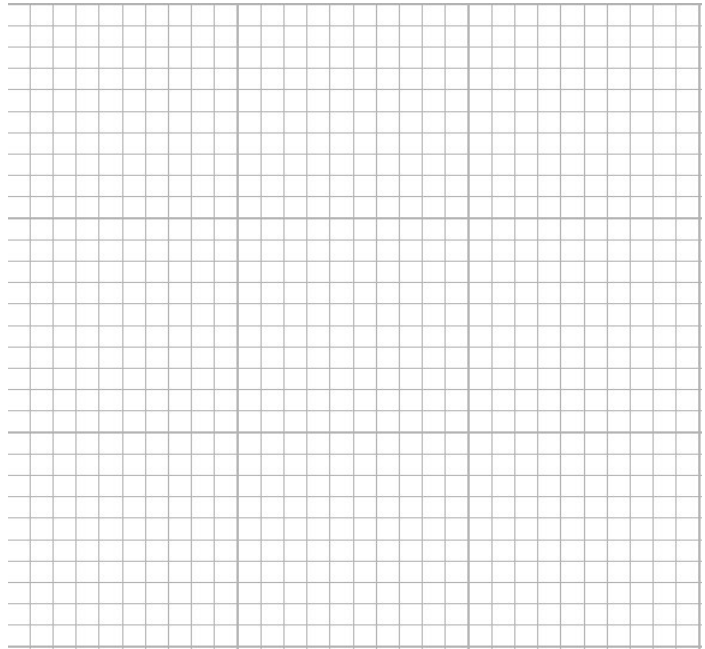
3. Write the limit as a definite integral on the interval $[a, b]$ where c_i is any point on the i th interval.

a. $\lim_{\|\Delta\| \rightarrow 0} \sum_{i=1}^n (8c_i + 15) \Delta x_i, \quad [2, 6]$

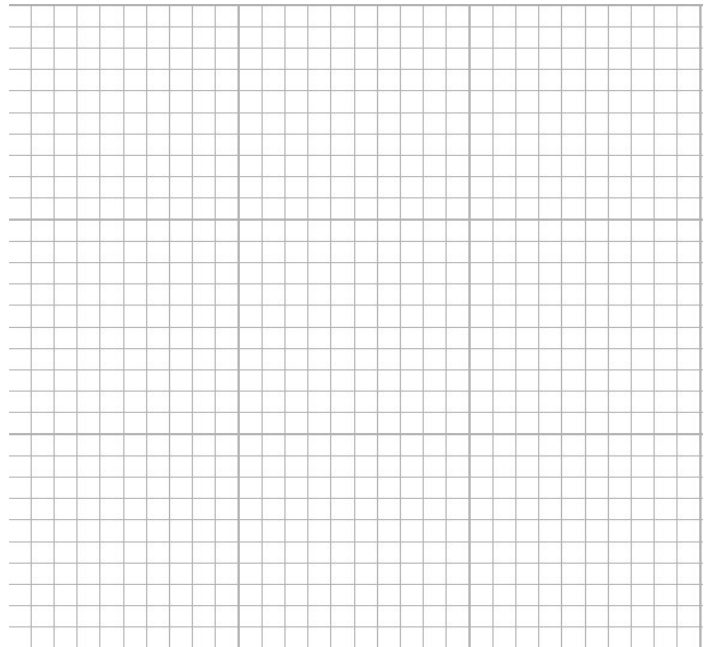
b. $\lim_{\|\Delta\| \rightarrow 0} \sum_{i=1}^n 5c_i \sqrt{c_i^2 + 2\Delta x_i}, \quad [0, 12]$

4. Sketch the region whose area is given by the definite integral. Then use a geometric formula to evaluate the integral.

a. $\int_{-2}^6 6dx$



b. $\int_{-4}^4 \sqrt{16-x^2} dx$



5. Given $\int_0^3 f(x)dx = 4$ and $\int_3^6 f(x)dx = -1$, evaluate

a. $\int_0^6 f(x)dx$

b. $\int_6^3 f(x)dx$

c. $\int_3^3 f(x)dx$

d. $\int_3^6 f(x)dx$