

$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{2}{n} \left(9 + \frac{2i}{n}\right)^{12}$  can be interpreted as the area of the region lying under the graph of  $y = (9 + x)^{12}$  on the interval  $[0, 2]$ , since for  $y = (9 + x)^{12}$  on  $[0, 2]$  with  $\Delta x = \frac{2 - 0}{n} = \frac{2}{n}$ ,  $x_i = 0 + i \Delta x = \frac{2i}{n}$ , and  $x_i^* = x_i$ , the expression for the area is

$$A = \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i^*) \Delta x = \lim_{n \rightarrow \infty} \sum_{i=1}^n \left(9 + \frac{2i}{n}\right)^{12} \frac{2}{n}.$$

Note that the answer is not unique. We could use  $y = x^{12}$  on  $[9, 11]$  or, in general,  $y = ((9 - n) + x)^{12}$  on  $[n, n + 2]$ .