

Exercise 13

For the following exercises, find the average rate of change of each function on the interval specified for real numbers b or h .

$$j(x) = 3x^3 \text{ on } [1, 1 + h]$$

Solution

The average rate of change of the function on $[1, 1 + h]$ is

$$\begin{aligned} \frac{j(1+h) - j(1)}{(1+h) - 1} &= \frac{3(1+h)^3 - 3(1)^3}{h} \\ &= \frac{3(1 + 3h + 3h^2 + h^3) - 3(1)}{h} \\ &= \frac{3 + 9h + 9h^2 + 3h^3 - 3}{h} \\ &= \frac{9h + 9h^2 + 3h^3}{h} \\ &= 9 + 9h + 3h^2. \end{aligned}$$