

Exercise 9

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

$$f(x) = 2x^2 + 1 \text{ on } [x, x + h]$$

Solution

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

$$\begin{aligned} \frac{f(x+h) - f(x)}{(x+h) - x} &= \frac{[2(x+h)^2 + 1] - (2x^2 + 1)}{h} \\ &= \frac{[2(x^2 + 2xh + h^2) + 1] - (2x^2 + 1)}{h} \\ &= \frac{2x^2 + 4xh + 2h^2 + 1 - 2x^2 - 1}{h} \\ &= \frac{4xh + 2h^2}{h} \\ &= 4x + 2h. \end{aligned}$$