

Exercise 10

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

$$g(x) = 3x^2 - 2 \text{ on } [x, x + h]$$

Solution

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

$$\begin{aligned} \frac{g(x+h) - g(x)}{(x+h) - x} &= \frac{[3(x+h)^2 - 2] - (3x^2 - 2)}{h} \\ &= \frac{[3(x^2 + 2xh + h^2) - 2] - (3x^2 - 2)}{h} \\ &= \frac{3x^2 + 6xh + 3h^2 - 2 - 3x^2 + 2}{h} \\ &= \frac{6xh + 3h^2}{h} \\ &= 6x + 3h. \end{aligned}$$