Exercise 15

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

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

Solution

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

$$\begin{aligned}
\frac{f(x+h)-f(x)}{(x+h)-x} &= \frac{[2(x+h)^2 - 3(x+h)] - (2x^2 - 3x)}{h} \\
&= \frac{[2(x^2+2xh+h^2) - 3(x+h)] - (2x^2 - 3x)}{h} \\
&= \frac{(2x^2+4xh+2h^2 - 3x - 3h) - (2x^2 - 3x)}{h} \\
&= \frac{2x^2+4xh+2h^2 - 3x - 3h - 2x^2 + 3x}{h} \\
&= \frac{4xh+2h^2 - 3h}{h} \\
&= 4x + 2h - 3.
\end{aligned}$$