

Exercise 33

Given the function $g(x) = x^2 + 2x$, evaluate $\frac{g(x)-g(a)}{x-a}$, $x \neq a$.

Solution

Evaluate the expression using the given function. Notice that $x^2 - a^2$ is a difference of squares and factor it.

$$\begin{aligned}\frac{g(x) - g(a)}{x - a} &= \frac{(x^2 + 2x) - (a^2 + 2a)}{x - a} \\ &= \frac{x^2 - a^2 + 2x - 2a}{x - a} \\ &= \frac{(x + a)(x - a) + 2(x - a)}{x - a} \\ &= \frac{[(x + a) + 2](x - a)}{(x - a)} \\ &= [(x + a) + 2] \\ &= x + a + 2\end{aligned}$$