Exercise 1

A curve has equation $y = f(x)$.

(a) Write an expression for the slope of the secant line through the points $P(3, f(3))$ and $Q(x, f(x))$.

(b) Write an expression for the slope of the tangent line at P.

Solution

The slope of the secant line between the points, $P(3, f(3))$ and $Q(x, f(x))$, is

$$m = \frac{f(x) - f(3)}{x - 3}.$$

The slope of the tangent line at $P(3, f(3))$ is

$$f'(3) = \lim_{x \to 3} \frac{f(x) - f(3)}{x - 3}.$$