Differential Calculus

chapter 2

Section 2.2 Differentiating from first principles

PROJECT MATHS Text & Tests 7

Example 2

Differentiate $f(x) = x^2 - 6x$ from first principles.

① $f(x+h) =$

$f(x+h) = (x+h)^2 - 6(x+h)$

$= x^2 + 2xh + h^2 - 6x - 6h$

② $\frac{f(x+h) - f(x)}{h} =$

$\frac{f(x+h) - f(x)}{h} = \frac{x^2 + 2xh + h^2 - 6x - 6h - x^2 + 6x}{h}$

$= 2x + h - 6$

③ $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$f'(x) = 2x + 0 - 6$

$= 2x - 6$