

## HW Solutions

① Find  $f'(x)$ .

①  $f(x) = 3x^2 - 5x + 2$

$$f'(x) = \lim_{h \rightarrow 0} \frac{[3(x+h)^2 - 5(x+h) + 2] - [3x^2 - 5x + 2]}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{3x^2} + 6xh + 3h^2 - \cancel{5x} - 5h + \cancel{2} - \cancel{3x^2} + \cancel{5x} - \cancel{2}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{h} [6x + 3h - 5]}{\cancel{h}} = \underline{\underline{6x - 5}}$$

②  $f(x) = 1 - x^3$

$$f'(x) = \lim_{h \rightarrow 0} \frac{[1 - (x+h)^3] - [1 - x^3]}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{1} - \cancel{x^3} - 3x^2h - 3xh^2 - h^3 - \cancel{1} + \cancel{x^3}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{h} [-3x^2 - 3xh - h^2]}{\cancel{h}} = \underline{\underline{-3x^2}}$$

③  $f(x) = \sqrt{4x-1}$

$$f'(x) = \lim_{h \rightarrow 0} \frac{\sqrt{4(x+h)-1} - \sqrt{4x-1}}{h} \cdot \frac{\sqrt{4(x+h)-1} + \sqrt{4x-1}}{\sqrt{4(x+h)-1} + \sqrt{4x-1}}$$

$$= \lim_{h \rightarrow 0} \frac{4(x+h) - 1 - (4x-1)}{h [\sqrt{4(x+h)-1} + \sqrt{4x-1}]} = \frac{4}{2\sqrt{4x-1}} = \underline{\underline{\frac{2}{\sqrt{4x-1}}}}$$

