

Γ ΛΥΚΕΙΟΥ ΜΕΡΟΣ Α

14.1 1)

$$\begin{aligned} f'(-3) &= \lim_{x \rightarrow -3} \frac{f(x) - f(-3)}{x + 3} \stackrel{\substack{f(x) = -2x^2 + 3x - 5 \\ f(-3) = -32}}{=} \lim_{x \rightarrow -3} \frac{-2x^2 + 3x - 5 - (-32)}{x + 3} = \\ &= \lim_{x \rightarrow -3} \frac{-2x^2 + 3x + 27}{x + 3} \stackrel{-2x^2 + 3x + 27 = -(x+3)(2x-9)}{=} \lim_{x \rightarrow -3} \frac{\cancel{(x+3)}(2x-9)}{\cancel{x+3}} = -(-6-9) = 15 \end{aligned}$$

14.1 2)

$$f'(5) = \lim_{x \rightarrow 5} \frac{f(x) - f(5)}{x - 5} \stackrel{\substack{f(x) = 2x + 3 \\ f(5) = 13}}{=} \lim_{x \rightarrow 5} \frac{2x + 3 - 13}{x - 5} = \lim_{x \rightarrow 5} \frac{2x - 10}{x - 5} = \lim_{x \rightarrow 5} \frac{2\cancel{(x-5)}}{\cancel{x-5}} = 2$$

14.1 3)

$$f'(3) = \lim_{x \rightarrow 3} \frac{f(x) - f(3)}{x - 3} \stackrel{\substack{f(x) = -4x + 1 \\ f(3) = -11}}{=} \lim_{x \rightarrow 3} \frac{-4x + 1 + 11}{x - 3} = \lim_{x \rightarrow 3} \frac{-4x + 12}{x - 3} = \lim_{x \rightarrow 3} \frac{-4\cancel{(x-3)}}{\cancel{x-3}} = -4$$

14.1 4)

$$f'(2) = \lim_{x \rightarrow 2} \frac{f(x) - f(2)}{x - 2} \stackrel{\substack{f(x) = x^2 \\ f(2) = 4}}{=} \lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2} \frac{\cancel{(x-2)}(x+2)}{\cancel{x-2}} = 2 + 2 = 4$$

14.1 5)

$$\begin{aligned} f'(-1) &= \lim_{x \rightarrow -1} \frac{f(x) - f(-1)}{x + 1} \stackrel{\substack{f(x) = -3x^2 \\ f(-1) = -3}}{=} \lim_{x \rightarrow -1} \frac{-3x^2 + 3}{x + 1} = \lim_{x \rightarrow -1} \frac{-3(x^2 - 1)}{x + 1} = \\ &= \lim_{x \rightarrow -1} \frac{-3(x-1)\cancel{(x+1)}}{\cancel{x+1}} = -3(-1-1) = 6 \end{aligned}$$

14.1 6)

$$f'(0) = \lim_{x \rightarrow 0} \frac{f(x) - f(0)}{x - 0} \stackrel{\substack{f(x) = -x^2 + 7x \\ f(0) = 0}}{=} \lim_{x \rightarrow 0} \frac{-x^2 + 7x}{x} = \lim_{x \rightarrow 0} \frac{\cancel{x}(-x+7)}{\cancel{x}} = -0 + 7 = 7$$

14.1 7)

$$\begin{aligned} f'(1) &= \lim_{x \rightarrow 1} \frac{f(x) - f(1)}{x - 1} \stackrel{\substack{f(x) = 4x^2 - x \\ f(1) = 3}}{=} \lim_{x \rightarrow 1} \frac{4x^2 - x - 3}{x - 1} \stackrel{4x^2 - x - 3 = (x-1)(4x+3)}{=} \lim_{x \rightarrow 1} \frac{\cancel{(x-1)}(4x+3)}{\cancel{x-1}} = \\ &= \lim_{x \rightarrow 1} (4x + 3) = 4 \cdot 1 + 3 = 7 \end{aligned}$$

14.1 8)

$$f'(-2) = \lim_{x \rightarrow -2} \frac{f(x) - f(-2)}{x + 2} \stackrel{\substack{f(x) = x^2 + 2x - 1 \\ f(-2) = -1}}{=} \lim_{x \rightarrow -2} \frac{x^2 + 2x - \cancel{1} + \cancel{1}}{x + 2} = \lim_{x \rightarrow -2} \frac{x\cancel{(x+2)}}{\cancel{x+2}} = -2$$