

Calculus AB Ch. 2.1 Quiz Morning Review

1. Use the general definition of the derivative to:

a) find $\frac{d}{dx}f(x)$ if $f(x) = 2x^2 - 3x + 1$

b) Find $f'(-3)$

c) Find equation of the tangent line to $f(x)$ at $x = -3$

2. Use the Alternative Limits Definition:

a) Find $f'(-4)$ for $f(x) = \sqrt{2 - 3x}$

b) Write equation of the tangent line to $f(x)$ at $x = -4$

Practice Problems Quiz 2.1 Review

Answer Key

Use General Limits Definition

1) a) Find $\frac{d}{dx} f(x)$ for $f(x) = 2x^2 - 3x + 1$

b) Find $f'(-3)$

c) Find equation of tangent line to $f(x)$ at $x = -3$

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

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

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

$$\lim_{h \rightarrow 0} \frac{2x^2 + 4xh + 2h^2 - 3x - 3h + 1 - 2x^2 - 3x - 1}{h}$$

$$\lim_{h \rightarrow 0} \frac{4xh + 2h^2 - 3h}{h} = \lim_{h \rightarrow 0} \frac{h(4x + 2h - 3)}{h}$$

Ⓐ $f'(x) = 4x - 3$ Ⓑ $f'(-3) = -12 - 3 = -15$

Ⓒ point: $(-3, 28)$ slope: $m = -15$

$$y - 28 = -15(x + 3)$$

Use Alternative Limits Definition

2) a) Find $f'(-4)$ for $f(x) = \sqrt{2-3x}$

b) Write equation of tangent line to $f(x)$ at $x = -4$

$$f'(c) = \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c} \quad f(-4) = \sqrt{2+12} = \sqrt{14}$$

$$f'(-4) = \lim_{x \rightarrow -4} \frac{f(x) - f(-4)}{x - (-4)}$$

$$f'(-4) = \lim_{x \rightarrow -4} \frac{\sqrt{2-3x} - \sqrt{14}}{x+4} \cdot \frac{(\sqrt{2-3x} + \sqrt{14})}{(\sqrt{2-3x} + \sqrt{14})}$$

$$= \lim_{x \rightarrow -4} \frac{2-3x-14}{(x+4)(\sqrt{2-3x} + \sqrt{14})}$$

$$= \lim_{x \rightarrow -4} \frac{-12-3x}{(x+4)(\sqrt{2-3x} + \sqrt{14})}$$

$$f'(-4) = \lim_{x \rightarrow -4} \frac{-3(4+x)}{(x+4)(\sqrt{2-3x} + \sqrt{14})}$$

$$= \lim_{x \rightarrow -4} \frac{-3}{\sqrt{2-3x} + \sqrt{14}} = \frac{-3}{\sqrt{14} + \sqrt{14}} = \frac{-3}{2\sqrt{14}}$$

$$f'(-4) = \frac{-3}{2\sqrt{14}}$$

b) $f(-4) = \sqrt{14}$

point: $(-4, \sqrt{14})$

slope: $m = \frac{-3}{2\sqrt{14}}$

$$y - \sqrt{14} = \frac{-3}{2\sqrt{14}}(x + 4)$$