

Quiz 1 Solution

$$\begin{aligned} 1. \text{ slope} &= \lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h} = \lim_{h \rightarrow 0} \frac{[3 \cdot (1+h)^2 + 2016] - [3 \cdot 1^2 + 2016]}{h} \\ &= \lim_{h \rightarrow 0} \frac{3 \cdot [(1+h)^2 - 1^2]}{h} = \lim_{h \rightarrow 0} \frac{3 \cdot [1 + 2h + h^2 - 1]}{h} \\ &= \lim_{h \rightarrow 0} \frac{3 \cdot (2h + h^2)}{h} = \lim_{h \rightarrow 0} 3 \cdot (2 + h) = 6 \end{aligned}$$

$$\begin{aligned} 2. \lim_{x \rightarrow 0} \frac{1 - \sqrt{1-x^2}}{x} &= \lim_{x \rightarrow 0} \frac{(1 - \sqrt{1-x^2}) \cdot (1 + \sqrt{1-x^2})}{x \cdot (1 + \sqrt{1-x^2})} \\ &= \lim_{x \rightarrow 0} \frac{1 - (1-x^2)}{x \cdot (1 + \sqrt{1-x^2})} = \lim_{x \rightarrow 0} \frac{x^2}{x \cdot (1 + \sqrt{1-x^2})} \\ &= \lim_{x \rightarrow 0} \frac{x}{1 + \sqrt{1-x^2}} = \frac{0}{2} = 0 \end{aligned}$$