

$$\begin{aligned}
 & 1. \frac{d}{dx} \left(\frac{2 \sin(x)}{1-3 \sin(x)} \right) \\
 &= \frac{(1-3 \sin(x)) \cdot \frac{d}{dx}(2 \sin(x)) - (2 \sin(x)) \frac{d}{dx}(1-3 \sin(x))}{(1-3 \sin(x))^2} \\
 &= \frac{(1-3 \sin(x))(2 \cos(x)) - (2 \sin(x))(-3 \cos(x))}{(1-3 \sin(x))^2} \\
 &= \frac{2 \cos(x)}{(1-3 \sin(x))^2}
 \end{aligned}$$

$$\begin{aligned}
 & 2. \lim_{x \rightarrow 4} \frac{x^2 - 16}{\sin(x^2 - 9x + 20)} \\
 &= \lim_{x \rightarrow 4} \frac{(x+4)(x-4)}{\sin((x-4)(x-5))} \cdot \frac{(x-5)}{(x-5)} \\
 &= \lim_{x \rightarrow 4} \frac{(x+4)(x-5)}{\sin((x-4)(x-5))} \cdot \frac{(x+4)}{(x-5)} \\
 & \text{Setting } u = (x-4)(x-5), \text{ notice} \\
 & \text{as } x \rightarrow 4, u \rightarrow 0. \\
 &= \left(\lim_{u \rightarrow 0} \frac{u}{\sin(u)} \right) \cdot \left(\lim_{x \rightarrow 4} \frac{x+4}{x-5} \right) \\
 &= (1) \cdot (-8) \\
 &= -8
 \end{aligned}$$