

$$\begin{aligned}\lim_{x \rightarrow 0} \frac{\sin 8x}{\sin 9x} &= \lim_{x \rightarrow 0} \left( \frac{\sin 8x}{x} \cdot \frac{x}{\sin 9x} \right) = \lim_{x \rightarrow 0} \frac{8 \sin 8x}{8x} \cdot \lim_{x \rightarrow 0} \frac{9x}{9 \sin 9x} \\ &= 8 \lim_{x \rightarrow 0} \frac{\sin 8x}{8x} \cdot \frac{1}{9} \lim_{x \rightarrow 0} \frac{9x}{\sin 9x} = 8(1) \cdot \frac{1}{9}(1) = \frac{8}{9}\end{aligned}$$