

$$\textcircled{2} \lim_{x \rightarrow 0} \frac{x \tan 2x - 2x \tan x}{(1 - \cos 2x)^2}$$

$$= \lim_{x \rightarrow 0} \frac{x \cdot \frac{2 \tan x}{1 - \tan^2 x} - 2x \tan x}{(2 \sin^2 x)^2}$$

$$= \lim_{x \rightarrow 0} \frac{2x \tan x \left[\frac{1}{1 - \tan^2 x} - 1 \right]}{4 \sin^4 x}$$

$$= \lim_{x \rightarrow 0} \frac{2x \tan x \left[\frac{1 - 1 + \tan^2 x}{1 - \tan^2 x} \right]}{4 \sin^4 x}$$

$$= \lim_{x \rightarrow 0} \frac{2x \tan^3 x}{4(1 - \tan^2 x) \sin^4 x}$$

$$= \lim_{x \rightarrow 0} \frac{\frac{1}{2} x \cdot \left(\frac{\tan x}{x} \right)^3 \cdot x^3}{\sin^4 x (1 - \tan^2 x)}$$

$$= \lim_{x \rightarrow 0} \frac{\frac{1}{2} \left(\frac{\tan x}{x} \right)^3}{\left(\frac{\sin x}{x} \right)^4 \cdot (1 - \tan^2 x)}$$

$$= \frac{1}{2} \cdot \frac{(1)^3}{(1)^4 \cdot (1 - 0)} = \frac{1}{2}$$