(101)

$$\lim_{x\to 0} \frac{\log(1-\cos 3x)}{\log(\operatorname{arctg} x^2)} =$$

$$= \lim_{x\to 0} \frac{\log\left(\frac{1-\cos 3x}{9x^2}\cdot 9x^2\right)}{\log\left(\frac{\operatorname{arctg} x^2}{x^2}\cdot x^2\right)} =$$

$$= \lim_{x\to 0} \frac{\log\left(\frac{1-\cos 3x}{9x^2}\right) + \log 9x^2}{\log\left(\frac{\operatorname{arctg} x^2}{x^2}\right) + \log x^2} =$$

$$= \lim_{x \to 0} \frac{\log\left(\frac{1-\cos 3x}{9x^2}\right) + \log 9 + \log x^2}{\log\left(\frac{\operatorname{arctg} x^2}{x^2}\right) + \log x^2} =$$

$$= \lim_{x \to 0} \frac{\frac{\log\left(\frac{1-\cos 3x}{9x^2}\right)}{\log x^2} + \frac{\log 9}{\log x^2} + 1}{\frac{\log\left(\frac{\operatorname{arctg} x^2}{x^2}\right)}{\log x^2} + 1} = 1$$