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$$\lim_{x\to 0} (\operatorname{arctg} x)^{\operatorname{tg} 5x} =$$

$$= \lim_{x\to 0} e^{\operatorname{tg} 5x \log \operatorname{arctg} x}$$

$$= \lim_{x\to 0} e^{\operatorname{tg} 5x \cdot \operatorname{arctg} x \frac{\log \operatorname{arctg} x}{\operatorname{arctg} x}} =$$

$$= e^{\lim_{x\to 0} \frac{\operatorname{tg} 5x}{5x} \cdot \frac{5x}{\operatorname{arctg} x} (\log \operatorname{arctg} x)}$$

$$= e^{1 \cdot 1 \cdot 0} = e^0 = 1$$