265 - Del Prete 5-1991 Compito 3

$$\lim_{x\to 0^+} (\operatorname{sen} 3x)^{1-\cos x} =$$

$$= \lim_{x\to 0^+} e^{(1-\cos x)\log \operatorname{sen} 3x} =$$

$$= \lim_{x\to 0^+} e^{(1-\cos x)\log 3x \cdot \frac{\operatorname{sen} 3x}{3x}}$$

$$= \lim_{x\to 0^+} e^{(1-\cos x)\log 3x} \, e^{(1-\cos x)\log \frac{\operatorname{sen} 3x}{3x}} =$$

$$= \lim_{x\to 0^+} e^{\frac{1}{3}\frac{1-\cos x}{x}\cdot 3x \log 3x} \, e^{(1-\cos x)\log \frac{\operatorname{sen} 3x}{3x}} =$$

$$= e^{\frac{1}{3}\cdot 0\cdot 0} \, e^{0\cdot 0} = e^{0} = 1$$

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$3x$

$=$

$\frac{\operatorname{sen} 3x}{3x}$

$\ldots x) \log \frac{\operatorname{sen} 3x}{3x}$

$=$

$(1-\cos x) \log \frac{\operatorname{sen} 3x}{3x} =$

$=$

$e^{0} = 1$

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$$\lim_{x \to +\infty} \left(3^x + \operatorname{arctg} x\right)^{\frac{x}{x^2-3}} =$$

$$= \lim_{x \to +\infty} e^{\frac{x}{x^2-3} \log\left(3^x + \operatorname{arctg} x\right)} =$$

$$= \lim_{x \to \infty} e^{\frac{x}{x^2-3} \log\left[3^x\left(1 + \frac{\operatorname{arctg} x}{3^x}\right)\right]}$$

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

$$= \lim_{x \to +\infty} e^{\frac{x}{x^2-3} \log_3 \cancel{x} \frac{1}{\log_3 e}} e^{\frac{x}{x^2-3} \frac{\operatorname{arctg} x}{3^x} \frac{\log\left(1+\frac{\operatorname{arctg} x}{3^x}\right)}{\frac{\operatorname{arctg} x}{3^x}}}$$

$$= \lim_{x \to +\infty} e^{\frac{x^2}{x^2-3} \frac{1}{\log_3 e}} e^{\frac{x}{x^2-3} \frac{\operatorname{arctg} x}{3^x} \frac{\log\left(1+\frac{\operatorname{arctg} x}{3^x}\right)}{\frac{\operatorname{arctg} x}{3^x}}} =$$

$$= e^{\frac{1}{\log_3 e}} e^{0 \cdot 0 \cdot 0} = e^{\frac{1}{\log_3 e}}$$