$\ln y = \ln \left(\frac{1}{x}\right)^{x^2} = -x^2 \ln x$

$\lim_{x \to 0} \ln y = \lim_{x \to 0} -x^2 \ln(x) = \lim_{x \to 0} \frac{\ln x}{-x^{-2}} = \left[\frac{0}{0}\right]$

$\lim_{x \to 0} \frac{\ln x}{-x^{-2}} = \lim_{x \to 0} \frac{1/x}{2x^{-3}} = \lim_{x \to 0} \frac{2x^{-3}}{x} = 0$

$\ln \lim_{x \to 0} y = e^0$ т.е. $\lim_{x \to 0} y = \lim_{x \to 0} \left(\frac{1}{x}\right)^{x^2} = 1$

7.327.

$\lim_{x \to 0} x^{\frac{1}{1+\ln x}} = [0^{\infty}]$

$y = x^{\frac{1}{1+\ln x}}$

$\ln y = \ln x^{\frac{1}{1+\ln x}} = \frac{1}{1+\ln x} \cdot \ln x$

$\lim_{x \to 0} \ln y = \lim_{x \to 0} \frac{1}{1+\ln x} \cdot \ln x$

$\lim_{x \to 0} \frac{\ln x}{1+\ln y} = \left[\frac{0}{0}\right] = \lim_{x \to 0} \frac{x^{-1}}{x^{-1}} = \lim_{x \to 0} 1 = 1$

$\lim_{x \to 0} \ln y = \ln \lim_{x \to 0} y = e^1$

$\Rightarrow \lim_{x \to 0} y = \lim_{x \to 0} x^{\frac{1}{1+\ln x}} = e.$

$= \lim_{x \to 1} \frac{3x^2 - 2x}{5x^4 - 3x^2 - 2x} = \frac{3 \cdot 1 - 2 \cdot 1}{5 \cdot 1 - 3 \cdot 1 - 2 \cdot 1} = \frac{1}{0} = \infty$

7.3.25 - 7.3.28 (до 18.05.2020.)

$\lim_{x \to 0} (\cos 2x)^{\frac{1}{x^2}} = [0^{\infty}]$ $\quad y = (\cos 2x)^{\frac{1}{x^2}}$

$\ln y = \ln (\cos 2x)^{\frac{1}{x^2}} = x^{-2} \ln (\cos 2x)$

$\lim_{x \to 0} \ln y = \lim_{x \to 0} x^2 \ln (\cos 2x)$

$\lim_{x \to 0} \frac{\ln (\cos 2x)}{x^2} = \left[\frac{0}{0}\right] = \lim_{x \to 0} \frac{\frac{-2\sin 2x}{\cos 2x}}{2x} =$

$= \lim_{x \to 0} \frac{-\sin 2x}{\cos 2x} = \lim_{x \to 0} (-\operatorname{tg} 2x)$

$\ln \lim_{x \to 0} = \lim_{x \to 0} \ln y = e^{-2}$

$\lim_{x \to 0} y = \lim (\cos 2x)^{\frac{1}{x^2}} = e^{-2}$

7.3.26.

$\lim_{x \to 0} \left(\frac{1}{x}\right)^{x^2} = [\infty^0]$

$y = \left(\frac{1}{x}\right)^{x^2}$