2 7 3 2 5

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

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

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

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

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

$$\lim_{x \to 0} y = 1$$

$$\lim_{x \to 0} (\ln \cdot \cos 2x / x^2) = \left[\frac{0}{0} \right] = \left(\left(\frac{1}{\cos 2x} \cdot (-2 \cdot \sin(2x)) \right) : 2x \right)$$

$$= \lim_{x \to 0} \left(-2 \frac{\sin 2x}{\cos 2x} \cdot \frac{1}{2x} \right) = \lim_{x \to 0} \left(-tg2x / x \right) = \left[\frac{0}{0} \right] =$$

$$\lim_{x \to 0} \left(-\frac{2}{\cos(2x)^2} \right) = -\frac{2}{1} = -2$$

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

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

$$\approx 7326$$

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

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

$$\overline{\log y} = x^2 e \ln \frac{1}{x} = -x^2 \cdot \ln x$$

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

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

$$\lim_{x \to 0} \ln y = 0$$

$$\lim_{x \to 0} y = \lim_{x \to 0} \left(\frac{1}{x}\right)^{x^2} = 1 \quad \{e^0\}$$

≈ 7.3.**21**

$$\lim_{x \to 0} x^{\frac{1}{1+\ln x}}$$

$$\lim_{x \to 0} (\ln y) = \frac{1}{\lim_{x \to 0} 1+\ln x} \cdot \ln x = \lim_{x \to 0} \frac{\ln x}{1+\ln x} = \left[\frac{\infty}{\infty}\right]$$

$$\lim_{x \to 0} \frac{(1/x) \cdot (1+\ln x) - (1/x) \cdot \ln x}{(1+\ln x)^2} =$$

$$= \lim_{x \to 0} \frac{1/x + \ln x/x - \ln x/x}{(1+\ln x)^2} = \lim_{x \to 0} \frac{1/x \left(\cancel{1+} 1 + \ln x - \ln x\right)}{(1+\ln x)^2} =$$

$$= \lim_{x \to 0} \frac{1}{x} \cdot \frac{1}{(1+\ln x)^2} = \lim_{x \to 0} \frac{1}{x(1+\ln x)^2} = \frac{1}{0} = \infty$$