$$= \lim_{x\to 0}\left(\frac{-\sin 2x}{\cos 2x}\cdot\frac{1}{x}\right) = \cancel{\lim_{x\to 0} \frac{tg\,2x}{x}}$$

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

$$= -2$$

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

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

№7.3.26

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

$$= \lim_{x\to 0} x^2 \ln\frac{1}{x} = [0\cdot\infty] =$$

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

$$= \lim_{x\to 0} \frac{\left(\ln\frac{1}{x}\right)'}{\left(\frac{1}{x^2}\right)'} = \lim_{x\to 0} \frac{-\frac{1}{x}}{-\frac{2}{x^3}} =$$

$$= \lim_{x\to 0} \cancel{\frac{2}{x^2}}\ \frac{x^2}{2} = 0 \Rightarrow$$

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

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

№7.3.27

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

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

$$= \lim_{x\to 0} \frac{(\ln x)'}{(1+\ln x)'} \lim_{x\to 0} \frac{\frac{1}{x}}{\frac{1}{x}} = \cancel{\lim_{x\to 0}}\ 1$$

$$\lim_{x\to 0} \ln\left(x^{\frac{1}{1+\ln x}}\right) = 1 \Rightarrow \lim_{x\to 0} x^{\frac{1}{1+\ln x}} = e$$

~~№7.3.28~~

Фор-ла Тейлора:

$$f(x) = f(x_0) + \frac{f'(x_0)}{1!}(x-x_0) + \ldots + \frac{f^{(n)}(x_0)}{n!}(x-x_0)^n$$

№7.3.29

$$P(x) = x^3 + 4x^2 - 6x - 8,\ x_0 = -1,$$

$$n \le 3$$

$$P(x) = P(-1) + \frac{P'(-1)}{1!}(x+1) + \frac{P''(-1)}{2!}(x+1)^2 +$$

$$+ \frac{P'''(-1)}{3!}(x+1)^3 + o((x+1)^3)$$

$$P(-1) = (-1)^3 + 4\cdot(-1)^2 - 6\cdot(-1) - 8 =$$

$$= -1 + 4 + 6 - 8 = 1$$