Функции 1 перем. Замеч. предел.

$$\lim_{x\to0}\frac{\sin x}{x}=1 \quad \Big| \quad \lim_{x\to0}\frac{x}{\sin x} \quad \Big| \quad \lim_{x\to0}\frac{tg\,x}{x}=1$$

$$\lim_{x\to0} x\cdot ctg\,3x=[0\cdot\infty]=\lim_{x\to0} x\cdot\frac{1}{tg\,3x}=$$

$$=\lim\frac{\overbrace{3\cdot x}^{\to1}}{3\,tg\,3x}=\frac{1}{3}$$

$$\lim_{x\to0}\frac{\sin6x-\sin2x}{\arcsin3x}=\left[\frac{0}{0}\right]\lim_{x\to0}\frac{2\sin2x\cdot\cos4x}{\arcsin3x}=$$

$$=2\lim_{x\to0}\frac{\overbrace{\frac{\sin2x}{2x}}^{\to1}\cdot\overbrace{\cos4x}^{\to1}\cdot2\cancel{x}}{\underbrace{\frac{\arcsin3x}{3x}}_{\to1}\cdot3\cancel{x}}=2\cdot\frac{2}{3}=\frac{4}{3}$$

Второй замечательный предел.

$$\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x=e \qquad \lim_{\alpha(x)\to0}\left(1+\alpha(x)\right)^{\frac{1}{\alpha(x)}}=e$$

$$\lim_{x\to0}\frac{a^x-1}{x}=\ln a \qquad \lim_{x\to0}\frac{e^x-1}{x}=1$$

$$\lim_{x\to0}\frac{\log_a(1+x)}{x}=\frac{1}{\ln a} \qquad \lim_{x\to0}\frac{\ln(1+x)}{x}=1$$

предел.

1

$\frac{1}{tg^3x} =$

$\ldots 2x \cdot \cos 4x$

$\ldots rcsin\, 3x =$

$\frac{2}{3} = \frac{4}{3}$

предел.

$(x)|^{\frac{1}{\alpha(x)}} = e$

1

$) = 1$

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

$$= \lim_{x\to\infty}\Big(\underbrace{\left(1+\frac{2}{x}\right)^{\frac{x}{2}}}_{\to e}\Big)^2 = e^2$$

$$\lim_{x\to2}\frac{x^2-4}{\sqrt{x+2}-\sqrt{6-x}} = \left[\frac{0}{0}\right] = \lim_{x\to2}\frac{(x^2-4)(\sqrt{x+2}+\sqrt{6-x})}{x+2-6+x} =$$

$$= \frac{(x^2-4)(\sqrt{x+2}+\sqrt{6-x})}{\cancel{x^2+x-4}\quad 2x-4} = \frac{\cancel{(x-2)}(x+2)(\sqrt{x+2}+\sqrt{6-x})}{2\cancel{(x-2)}} =$$

$$= 8$$

$$\cancel{\lim_{x\to3}\left(\frac{(x+3)}{(x-3)(x+3)} - \frac{6}{x^2-9}\right) = \lim_{x\to3}\frac{1}{x}}$$

$$\lim_{x\to3}\left(\frac{1}{x-3}-\frac{6}{x^2-9}\right) = \lim_{x\to3}\left(\frac{x+3-6}{(x-3)(x+3)}\right) =$$

$$\lim_{x\to3}\left(\frac{\cancel{x-3}}{\cancel{(x-3)}(x+3)}\right) = \lim_{x\to3}\frac{1}{x+3} = \frac{1}{6}$$

$$\lim_{x\to 3}(2x^2-4x+5) = 11$$

$$\lim_{x\to 4}\frac{x^2-2x}{x-3} = \frac{16-8}{1} = \frac{8}{1}$$

$$\lim_{x\to 3}\frac{x^2-2x}{x-3} = \frac{3}{0} = \infty$$

$$\lim_{x\to\infty}\frac{\cos 2x}{x^3} = 0$$

$$\lim_{x\to\infty}\frac{12x-2}{\sqrt[3]{27x^3+6x+1}} \left[\frac{\infty}{\infty}\right] = \lim_{x\to\infty}\frac{\frac{12x}{x}-\frac{2}{x}}{\sqrt[3]{27+\frac{6}{x^2}+\frac{1}{x^3}}} =$$

$$= \frac{12}{3} = 4$$

$$\lim_{x\to\infty}\frac{\sqrt[3]{x^8+1}}{x^2+\sqrt[3]{x}} = \lim_{x\to\infty}\frac{\sqrt[3]{\frac{x^8}{x^6}+\frac{1}{x^6}}}{1+\sqrt{\frac{x}{x^4}}} = \frac{\infty}{1} = \infty$$

$$\lim_{x\to\infty}\frac{3^x+2^x}{1+3^x} = \lim_{x\to\infty}\frac{1+\frac{2^x}{3^x}}{\frac{1}{3^x}+1} = 1$$

$$= \frac{\quad}{\ldots 2 + \frac{1}{x3}} =$$

$$\frac{\infty}{1} = \infty$$

$$\lim_{x\to\infty}\frac{5x+8\cos x}{3x+2}=\left[\frac{\infty}{\infty}\right]=\lim_{x\to\infty}\frac{5+\frac{8\cos x}{x}\to 0}{3+\frac{2}{x}\to}=\frac{5}{3}$$

$$\lim_{x\to 4}\frac{x^2-6x+8}{x^2-4x}=\left[\frac{0}{0}\right]=\lim_{x\to 4}\frac{\cancel{(x-4)}(x-2)}{x\cancel{(x-4)}}=\lim_{x\to 4}\frac{x-2}{x}=\frac{1}{2}$$

$x^2-6x+8=0$ $\quad D=36-4\cdot 8=4$ $\quad x_1=\frac{6+2}{2}=4$

$x_2=\frac{6-2}{2}=2$

$$\lim_{x\to 1}\frac{3x^2-x-2}{4x^2-5x+1}=\left[\frac{0}{0}\right]=$$

$$=\lim_{x\to 1}\frac{3\cancel{(x-1)}(x+\frac{2}{3})}{4\cancel{(x-1)}(x-\frac{1}{4})}=\frac{3\cdot 1\frac{2}{3}}{4\cdot\frac{3}{4}}=$$

$$=\frac{5}{3}$$

$3x^2-x-2=0$

$D=1-4\cdot 3\cdot(-2)=25$

$x_1=\frac{1+5}{3\cdot 2}=1$

$x_2=\frac{1-5}{3\cdot 2}=\frac{-4}{6}=-\frac{2}{3}$

$4x^2-5x+1=0$

$D=25-4\cdot 4\cdot 1=9$

$x_1=\frac{5+3}{8}=1$

$x_2=\frac{5-3}{8}=\frac{1}{4}$