$$\lim_{x\to 1}\frac{x+5}{x^3+1}=\frac{1+5}{1^3+1}=\frac{6}{2}=3$$

3

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

$\frac{0}{0}$

$$=\underline{\lim_{x\to 1}\frac{(x-1)(x-2)}{(x-1)(x+1)}}=\underline{\lim_{x\to 1}\frac{x-2}{x+1}}=\frac{1-2}{1+1}=-\frac{1}{2}$$

$$\lim_{x\to 0}\frac{2x}{\sqrt{1+3x}-1}=$$

$\frac{4}{3}$

$$=\lim_{x\to 0}\frac{2x\left(\sqrt{1+3x}+1\right)}{\left(\sqrt{1+3x}-1\right)\left(\sqrt{1+3x}+1\right)}=\lim_{x\to 0}\frac{2x\left(\sqrt{1+3x}+1\right)}{1+3x-1}=$$

$$=\underline{\lim_{x\to 0}\frac{2x\left(\sqrt{1+3x}+1\right)}{3x}}=\underline{\lim_{x\to 0}\frac{2\left(\sqrt{1+3x}+1\right)}{3}}=\frac{2\left(\sqrt{1}+1\right)}{3}=\frac{4}{3}$$

$$\lim_{x\to 1}\frac{\sqrt{x}-1}{\sqrt{x^3}-1}=\lim_{x\to 1}\frac{\sqrt{x}-1}{(\sqrt{x})^3-1^3}=$$

$$a^3-b^3=(a-b)(a^2+ab+b^2)$$

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

$$=\underline{\lim_{x\to 1}\frac{\sqrt{x}-1}{(\sqrt{x}-1)\left((\sqrt{x})^2+\sqrt{x}+1\right)}}=\underline{\lim_{x\to 1}\frac{1}{(\sqrt{x})^2+\sqrt{x}+1}}=\frac{1}{3}$$

R

$$\lim_{x\to 0}\frac{\sin 2x}{7x}$$

$$\lim_{x\to 0}\frac{\sin x}{x}=1$$

$\frac{2}{7}$

$$\lim_{x\to 0}\frac{\sin 2x}{2x}\cdot\frac{2}{7}=\lim_{t\to 0}\frac{\sin t}{t}\cdot\frac{2}{7}=1\cdot\frac{2}{7}=\frac{2}{7}$$

$t=2x$

$$\frac{\sin 2x}{7x}=\frac{1}{7}\cdot\frac{\sin 2x}{x}=\frac{1}{7}\cdot 2\frac{\sin 2x}{2x}$$

$$\lim_{x\to 0}\frac{1}{2x\operatorname{ctg}3x}=$$

$$\operatorname{ctg}x=\frac{\cos x}{\sin x}$$

$$=\lim_{x\to 0}\frac{1}{2x\frac{\cos 3x}{\sin 3x}}=\lim_{x\to 0}\frac{\sin 3x}{2x\cos 3x}=$$

$$=\lim_{x\to 0}\underbrace{\frac{\sin 3x}{2x}}_{\to\frac{3}{2}}\cdot\underbrace{\frac{1}{\cos 3x}}_{\to 1}=\frac{3}{2}\cdot 1=\frac{3}{2}$$

4

$$\lim_{x\to 0}\frac{\sin 2x}{\sqrt{2x+4}-2}=$$

$$=\lim_{x\to 0}\frac{\sin 2x\left(\sqrt{2x+4}+2\right)}{\left(\sqrt{2x+4}-2\right)\left(\sqrt{2x+4}+2\right)}=$$

$$=\lim_{x\to 0}\frac{\sin 2x\left(\sqrt{2x+4}+2\right)}{2x+4-4}=\lim_{x\to 0}\frac{\sin 2x\left(\sqrt{2x+4}+2\right)}{2x}=$$

$$=\lim_{x\to 0}\underbrace{\frac{\sin 2x}{2x}}_{\to 1}\cdot\lim_{x\to 0}\left(\sqrt{2x+4}+2\right)=$$

$$= 1 \cdot (\sqrt{4}+2) = 4$$

$$\lim_{x \to 0} x^2 \sin \frac{1}{x^2} = 0 \qquad 0$$

$x^2 \to 0$, $\sin \frac{1}{x^2}$ ohranič.

$h(x) = f(x) g(x)$ — ohranič

$h(x) \to 0$, $f(x) \to 0$

$$\lim_{x \to \infty} \frac{\sin^2 x}{2^x} = \lim_{x \to \infty} \sin^2 x \cdot \frac{1}{2^x} = 0 \qquad 0$$

$\sin^2 x$ ohranič., $\frac{1}{2^x} \to 0$

$$\lim_{x \to 1} \frac{\sin(x^2-1)}{x-1} = \lim_{x \to 1} \frac{\sin(x^2-1)(x+1)}{(x-1)(x+1)} =$$

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

$$\cdot \lim_{x \to 1}(x+1) = \lim_{t \to 0} \frac{\sin t}{t} \cdot 2 = 1 \cdot 2 = 2$$