6.4.14

1) $\lim\limits_{x\to -1} \frac{3x^2-1}{4x^2+5x+2} = \frac{\lim\limits_{x\to -1}(3x^2-1)}{\lim\limits_{x\to -1}(4x^2+5x+2)} =$

$= \frac{3\lim\limits_{x\to -1} x^2 - 1}{4\lim\limits_{x\to -1} x^2 + 5\lim\limits_{x\to -1} x + 2} = \frac{3-1}{4-5+2} = \underline{2}$

2) $\lim\limits_{x\to 2} \frac{x^2-4}{x^2-5x+6} = \left[\frac{0}{0}\right] = \lim\limits_{x\to 2} \frac{(x-2)(x+2)}{(x-2)(x-3)} =$

$= \lim\limits_{x\to 2} \frac{x+2}{x-3} = \frac{\lim\limits_{x\to 2}(x+2)}{\lim\limits_{x\to 2}(x-3)} = \frac{2+2}{2-3} = \underline{-4}$

3) $\lim\limits_{x\to 1} \frac{\sqrt{x+8}-3}{x-1} = \left[\frac{0}{0}\right] = \lim\limits_{x\to 1} \frac{(\sqrt{x+8}-3)(\sqrt{x+8}+3)}{(x-1)(\sqrt{x+8}+3)} =$

$= \lim\limits_{x\to 1} \frac{(x+8)-9}{(x-1)(\sqrt{x+8}+3)} = \lim\limits_{x\to 1} \frac{x-1}{(x-1)(\sqrt{x+8}+3)} =$

$= \lim\limits_{x\to 1} \frac{1}{\sqrt{x+8}+3} = \frac{1}{\sqrt{1+8}+3} = \underline{\frac{1}{6}}$

4) $\lim\limits_{x\to \infty} \frac{1+x-x^2}{2x^2+3x} = \left[\frac{\infty}{\infty}\right] = \lim\limits_{x\to \infty} \frac{x^2\left(\frac{1}{x^2}+\frac{1}{x}-1\right)}{x^2\left(2+\frac{3}{x}\right)} =$

$$= \frac{\lim\limits_{x\to\infty}\left(\frac{1}{x^2}+\frac{1}{x}-1\right)}{\lim\limits_{x\to\infty}\left(2+\frac{3}{x}\right)} = \frac{\lim\limits_{x\to\infty}\frac{1}{x^2}+\lim\limits_{x\to\infty}\frac{1}{x}-\lim\limits_{x\to\infty}1}{\lim\limits_{x\to\infty}2+3\lim\limits_{x\to\infty}\frac{1}{x}} =$$

$$= \frac{0+0-1}{2+0} = -\frac{1}{2}$$

6.4.23

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

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

$$= \frac{1^2+3}{2\cdot 1^2+1} = \frac{4}{3}$$

6.4.24

$$\lim_{x\to -6}\frac{x^2+7x+6}{x^3+6x^2+3x+18} = \left[\frac{0}{0}\right] =$$

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

$$= \lim_{x \to -6} \frac{x+1}{x^2+3} = \frac{-6+1}{(-6)^2+3} = -\frac{5}{39}$$

6.4.26

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

$$= \lim_{x \to 2} \left(\frac{(x^2-2x)\cdot(\sqrt{x^2+6x}+4)}{(\sqrt{x^2+6x}-4)(\sqrt{x^2+6x}+4)} \right) = \lim_{x \to 2} \frac{(x^2-2x)(\sqrt{x^2+6x}+4)}{x^2+6x-16} =$$

$$= \lim_{x \to 2} \frac{x\cdot(x-2)\cdot(\sqrt{x^2+6x}+4)}{(x+8)(x-2)} = \lim_{x \to 2} \frac{x(\sqrt{x^2+6x}+4)}{x+8} =$$

$$= \frac{2(\sqrt{2^2+6\cdot 2}+4)}{2+8} = \frac{2(\sqrt{16}+4)}{10} = \frac{16}{10} = \frac{8}{5}$$

6.4.28

$$\lim_{x \to 1} \frac{\sqrt{2-x}-1}{\sqrt{5-x}-2} = \left[\frac{0}{0}\right] = \lim_{x \to 1} \frac{(\sqrt{2-x}-1)(\sqrt{5-x}+2)(\sqrt{2-x}+1)}{(\sqrt{5-x}-2)(\sqrt{5-x}+2)(\sqrt{2-x}+1)} =$$

$$= \lim_{x \to 1} \frac{(2-x-1)(\sqrt{5-x}+2)}{(5-x-4)(\sqrt{2-x}+1)} = \lim_{x \to 1} \frac{(1-x)\cdot(\sqrt{5-x}+2)}{(1-x)\cdot(\sqrt{2-x}+1)} =$$

$$= \lim_{x \to 1} \frac{\sqrt{5-x}+2}{\sqrt{2-x}+1} = \frac{\sqrt{5-1}+2}{\sqrt{2-1}+1} = \frac{2+2}{1+1} = \frac{4}{2} = 2$$

6.4.29

$$\lim_{x\to 0}\frac{\sqrt[3]{8-x}-2}{x}=\left[\frac{0}{0}\right]=\lim_{x\to 0}\left(\frac{\sqrt[3]{8-x}-2}{x}\cdot\right.$$

$$\left.\cdot\frac{\sqrt[3]{(8-x)^2}+2\sqrt[3]{8-x}+4}{\sqrt[3]{(8-x)^2}+2\sqrt[3]{8-x}+4}\right)=\lim_{x\to 0}\left(\frac{8-x-8}{x(\sqrt[3]{(8-x)^2}+2\sqrt[3]{8-x}+4)}\right)=$$

$$=\lim_{x\to 0}\frac{-x}{x\cdot(\sqrt[3]{(8-x)^2}+2\sqrt[3]{8-x}+4)}=\lim_{x\to 0}\frac{-1}{\sqrt[3]{(8-x)^2}+2\sqrt[3]{8-x}+4}=$$

$$=\frac{-1}{\sqrt[3]{(8-0)^2}+2\sqrt[3]{8-0}+4}=\frac{-1}{4+2\cdot 2+4}=\frac{-1}{12}$$

6.4.30

$$\lim_{x\to 4}\frac{x^2-16}{\sqrt[3]{5-x}-\sqrt[3]{x-3}}=\left[\frac{0}{0}\right]=$$

$$=\lim_{x\to 4}\frac{(x^2-16)(\sqrt[3]{(5-x)^2}-\sqrt[3]{(5-x)(x-3)}+\sqrt[3]{(x-3)^2})}{(\sqrt[3]{5-x}-\sqrt[3]{x-3})(\sqrt[3]{(5-x)^2}-\sqrt[3]{(5-x)(x-3)}+\sqrt[3]{(x-3)^2})}=$$

$$=\lim_{x\to 4}\frac{(x-4)(x+4)\cdot(\sqrt[3]{(5-x)^2}-\sqrt[3]{(5-x)(x-3)}+\sqrt[3]{(x-3)^2})}{8-2x}=$$

$$=\lim_{x\to 4}\frac{(x+4)\cdot(\sqrt[3]{(5-x)^2}-\sqrt[3]{(5-x)(x-3)}+\sqrt[3]{(x-3)^2})}{-2}=$$

$$=\frac{(4+4)\cdot(\sqrt[3]{1^2}-\sqrt[3]{1\cdot(-1)}+\sqrt[3]{(-1)^2})}{-2}=\frac{8\cdot 3}{-2}=-12$$

6.4.31

$$\lim_{x\to\infty}\left(\frac{x+5x^2-x^3}{2x^3-x^2+7x}\right)=\left[\frac{-\infty}{+\infty}\right]=\lim_{x\to\infty}\left(\frac{x^3\cdot\left(\frac{1}{x^2}+\frac{5}{x}-1\right)}{x^3\cdot\left(2-\frac{1}{x}+\frac{7}{x^2}\right)}\right)=$$

$$=\lim_{x\to\infty}\left(\frac{\frac{1}{x^2}+\frac{5}{x}-1}{2-\frac{1}{x}+\frac{7}{x^2}}\right)=\frac{0+5\cdot0-1}{2-0+7\cdot0}=-\frac{1}{2}$$

6.4.32

$$\lim_{x\to\infty}\frac{1-3x^2}{x^2+7x-2}=\left[\frac{-\infty}{+\infty}\right]=\lim_{x\to\infty}\frac{x^2\cdot\left(\frac{1}{x^2}-3\right)}{x^2\left(1+\frac{7}{x}-\frac{2}{x^2}\right)}=$$

$$=\lim_{x\to\infty}\frac{\frac{1}{x^2}-3}{1+\frac{7}{x}-\frac{2}{x^2}}=\frac{0-3}{1+7\cdot0-2\cdot0}=\frac{-3}{1}=-3$$

6.4.33

$$\lim_{x\to\infty}\frac{x^3+x}{x^4-3x^2+1}=\left[\frac{\infty}{\infty}\right]=\lim_{x\to\infty}\left(\frac{x^4\cdot\left(\frac{1}{x}+\frac{1}{x^3}\right)}{x^4\cdot\left(1-\frac{3}{x^2}+\frac{1}{x^4}\right)}\right)=$$

$$=\lim_{x\to\infty}\left(\frac{\frac{1}{x}+\frac{1}{x^3}}{1-\frac{3}{x^2}+\frac{1}{x^4}}\right)=\frac{0+0}{1-3\cdot0+0}=\frac{0}{1}=0$$

6.4.34

$$\lim_{x\to\infty}\frac{x^5-2x}{2x^3+x^2+1}=\left[\frac{\infty}{\infty}\right]=\lim_{x\to\infty}\left(\frac{x^3\cdot\left(x^2-\frac{2}{x^2}\right)}{x^3\cdot\left(2+\frac{1}{x}+\frac{1}{x^3}\right)}\right)=$$

$$= \lim_{x\to\infty} \left(\frac{x^2 - \frac{2}{x^2}}{2+\frac{1}{x}+\frac{1}{x^3}} \right) = \frac{\lim\limits_{x\to\infty} \left(x^2 - \frac{2}{x^2}\right)}{\lim\limits_{x\to\infty} \left(2+\frac{1}{x}+\frac{1}{x^3}\right)} =$$

$$= \frac{+\infty - 2\cdot 0}{2+0+0} = \frac{+\infty}{2} = +\infty$$

6.4.35

$$\lim_{x\to+\infty} \left(\sqrt{x^2+4} - x\right) = [+\infty - \infty] =$$

$$= \lim_{x\to+\infty} \left(\left(\sqrt{x^2+4} - x\right) \cdot \frac{\sqrt{x^2+4}+x}{\sqrt{x^2+4}+x} \right) =$$

$$= \lim_{x\to+\infty} \frac{x^2+4-x^2}{\sqrt{x^2+4}+x} = \lim_{x\to+\infty} \frac{4}{\sqrt{x^2+4}+x} =$$

$$= \lim_{x\to+\infty} \frac{x\,\frac{4}{x}}{x\cdot\left(\sqrt{1+\frac{4}{x^2}}+1\right)} = \lim_{x\to+\infty} \frac{\frac{4}{x}}{\sqrt{1+\frac{4}{x^2}}+1} =$$

$$= \frac{4\cdot 0}{\sqrt{1+4\cdot 0}+1} = \frac{0}{2} = \underline{0}$$

6.4.36

$$\lim_{x\to\infty} \left(\frac{x^3}{x^2-3} - x \right) = [+\infty - \infty] =$$

$$= \lim_{x\to+\infty}\left(\frac{x^3 - x\cdot(x^2-3)}{x^2-3}\right) = \lim_{x\to+\infty}\frac{3x}{x^2-3} =$$

$$= \lim_{x\to+\infty}\frac{x^2\cdot\frac{3}{x}}{x^2\cdot(1-\frac{3}{x^2})} = \lim_{x\to+\infty}\frac{\frac{3}{x}}{1-\frac{3}{x^2}} = \frac{3\cdot 0}{1-3\cdot 0} = 0$$

6.4.46

$$1)\ \lim_{x\to\infty}\left(1+\frac{k}{x}\right)^x = [1^\infty] = \left[y=\frac{x}{k};\ x\to\infty \Rightarrow y\to\infty\right] =$$

$$= \lim_{x\to\infty}\left(1+\frac{1}{(\frac{x}{k})}\right)^{k\cdot\frac{x}{k}} = \lim_{y\to\infty}\left(1+\frac{1}{y}\right)^{ky} =$$

$$= \left(\lim_{y\to\infty}\left(1+\frac{1}{y}\right)^y\right)^k = \left[\text{2-й замеч. предел, } \lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x = e\right] =$$

$$= e^k$$

$$2)\ \lim_{x\to 0}\sqrt[x]{1+5x} = \lim_{x\to 0}(1+5x)^{\frac{1}{x}} = [y=5x,\ y\to 0 \text{ при } x\to 0] =$$

$$= \lim_{y\to 0}(1+y)^{\frac{1}{y}\cdot 5} = \left[\lim_{y\to 0}(1+y)^{\frac{1}{y}} = e\right] = \left(\lim_{y\to 0}(1+y)^{\frac{1}{y}}\right)^5 = e^5$$

$$3)\ \lim_{x\to\infty}\left(\frac{x+3}{x-2}\right)^x = \lim_{x\to\infty}\left(\frac{1+\frac{3}{x}}{1-\frac{2}{x}}\right)^x = \frac{\lim_{x\to\infty}\left(1+\frac{3}{x}\right)^x}{\lim_{x\to\infty}\left(1-\frac{2}{x}\right)^x} = \frac{e^3}{e^{-2}} = e^5$$

4) $\lim\limits_{x\to 0} \dfrac{e^{2x}-1}{7x} = [\,y=2x,\ y\to 0$ при $x\to 0\,] =$

$= \lim\limits_{y\to 0} \dfrac{e^{y}-1}{\frac{7}{2}y} = \dfrac{2}{7}\cdot \lim\limits_{y\to 0} \dfrac{e^{y}-1}{y} = \left[\lim\limits_{x\to 0} \dfrac{e^{x}-1}{x} = 1\right] =$

$= \dfrac{2}{7}\cdot 1 = \underline{\dfrac{2}{7}}$

6.4.48

$\lim\limits_{x\to 0} \sqrt[2x]{1+3x} = [1^{\infty}] = \lim\limits_{x\to 0} (1+3x)^{\frac{1}{2x}} =$

$= [\,y=3x,\ x\to 0 \Rightarrow y\to 0\,] = \lim\limits_{y\to 0} (1+y)^{\frac{1}{y}\cdot\frac{3}{2}} =$

$= \left(\lim\limits_{y\to 0} (1+y)^{\frac{1}{y}}\right)^{\frac{3}{2}} = \left[\lim\limits_{x\to 0} (1+x)^{\frac{1}{x}} = e\right] = \underline{e^{\frac{3}{2}}}$

6.4.49

$\lim\limits_{x\to\infty} \left(\dfrac{x-5}{x+4}\right)^{x} = [1^{\infty}] = [\,x+4=y,\ x\to\infty \Rightarrow y\to\infty\ ,\,] =$

$= \lim\limits_{y\to\infty} \left(\dfrac{y-9}{y}\right)^{y-4} = \lim\limits_{y\to\infty} \left(\left(1-\dfrac{9}{y}\right)^{y-4}\right) =$

$= \left(\lim\limits_{y\to\infty} \left(1-\dfrac{9}{y}\right)^{y}\right)^{\lim\limits_{y\to\infty} \frac{y-4}{y}} = \left[\lim\limits_{y\to\infty} \left(1+\dfrac{1}{y}\right)^{y} = e\right] =$

$$=\left(e^{-9}\right)^{\lim\limits_{y\to\infty}\frac{y\left(1-\frac{4}{y}\right)}{y}}=\left(e^{-9}\right)^{\lim\limits_{y\to\infty}\frac{1-\frac{4}{y}}{1}}=\left(e^{-9}\right)^{1}=e^{-9}$$

6.4.50

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

$$=\left[y=\frac{3x}{3+2x},\ x\to 0\Rightarrow y\to 0\right]=\lim_{y\to 0}(1+y)^{\frac{3-2y}{3y}}=$$

$$=\left(\lim_{y\to 0}(1+y)^{\frac{1}{y}}\right)^{\lim\limits_{y\to 0}\frac{3-2y}{3}}=\left[\lim_{x\to 0}(1+x)^{\frac{1}{x}}=e\right]=$$

$$=e^{\frac{3-2\cdot 0}{3}}=e^{\frac{3}{3}}=e$$

6.4.51

$$\lim_{x\to 2}\frac{e^{x}-e^{2}}{x-2}=\left[\frac{0}{0}\right]=\left[y=x-2,\ x\to 2\Rightarrow y\to 0\right]=$$

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

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

6.4.52

$$\lim_{x\to\infty}\left(\frac{5-x}{6-x}\right)^{x+2}=[1^{\infty}]=\lim_{x\to\infty}\left(1-\frac{1}{6-x}\right)^{x+2}=$$

$$=[y=-(6-x),\ x\to\infty \Rightarrow y\to\infty]=$$

$$=\lim_{y\to\infty}\left(1+\frac{1}{y}\right)^{y+8}=\lim_{y\to\infty}\left(1+\frac{1}{y}\right)^{y}\cdot$$

$$\cdot\lim_{y\to\infty}\left(1+\frac{1}{y}\right)^{8}=\left[\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^{x}=e\right]=$$

$$=e\cdot(1+0)^{8}=e\cdot 1^{8}=\underline{e}$$

6.4.53

$$\lim_{x\to e}\frac{\ln x-1}{x-e}=\left[\frac{0}{0}\right]=[y=x-e,\ x\to e\Rightarrow y\to 0]=$$

$$=\lim_{y\to 0}\frac{\ln(y+e)-\ln e}{y}=\lim_{y\to 0}\frac{\ln\left(\frac{y+e}{e}\right)}{y}=$$

$$=\lim_{y\to 0}\frac{\ln\left(\frac{y}{e}+1\right)}{y}=\left[t=\frac{y}{e},\ y\to 0\Rightarrow t\to 0\right]=$$

$$=\lim_{t\to 0}\frac{\ln(t+1)}{te}=\lim_{t\to 0}\frac{1}{e}\cdot\frac{\ln(t+1)}{t}=$$

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

$$= \frac{1}{e} \cdot 1 = e^{-1}$$

6.4.54

$$\lim_{x\to 0} (1-\sin x)^{\frac{1}{\sin x}} = [1^\infty] = [y = \sin x, x\to 0 \Rightarrow y \to 0] =$$

$$= \lim_{y\to 0} (1-y)^{\frac{1}{y}} = [t = -y, y\to 0 \Rightarrow t\to 0] =$$

$$= \lim_{t\to 0} (1+t)^{\frac{1}{-t}} = \left(\lim_{t\to 0} (1+t)^{\frac{1}{t}}\right)^{\lim\limits_{t\to 0} -1} =$$

$$= \left[\lim_{x\to 0} (1+x)^{\frac{1}{x}} = e\right] = e^{-1}$$

6.4.55

$$\lim_{x\to\infty} x(\ln(x+3) - \ln x) = [\infty \cdot 0] =$$

$$= \lim_{x\to\infty} \left(x \cdot \ln\left(\frac{x+3}{x}\right)\right) = \lim_{x\to\infty} \left(x \cdot \ln\left(1 + \frac{3}{x}\right)\right) =$$

$$= \left[y = \frac{1}{x}, x\to\infty \Rightarrow y\to 0\right] = \lim_{y\to 0} \frac{\ln(1+3y)}{y} = [t = 3y, y\to 0 \Rightarrow t\to 0] =$$

$$= \lim_{t\to 0} \frac{\ln(1+t)}{\frac{t}{3}} = \lim_{t\to 0} \frac{\ln(1+t)}{t} \cdot \lim_{t\to 0} 3 =$$

$$= \left[\lim_{x\to 0} \frac{\ln(1+x)}{x} = 1\right] = 1 \cdot 3 = \underline{3}$$

6.4.59

1) $\lim_{x\to 0} \frac{\sin 4x}{\sin 3x} = \left[\frac{0}{0}\right] = [\sin \alpha x \sim \alpha x, x \to 0] =$

$$= \lim_{x\to 0} \frac{4x}{3x} = \lim_{x\to 0} \frac{4}{3} = \underline{\frac{4}{3}}$$

2) $\lim_{x\to 0} \frac{x\cdot(e^x-1)}{1-\cos x} = \left[\frac{0}{0}\right] = \left[e^x - 1 \sim x, 1-\cos x \sim \frac{x^2}{2},\right.$

$\left. x \to 0\right] = \lim_{x\to 0} \frac{x\cdot x}{\frac{x^2}{2}} = \lim_{x\to 0} \frac{2}{1} = \underline{2}$

6.4.60

$$\lim_{x\to 0} \frac{tg 5x}{2x} = \left[\frac{0}{0}\right] = [t = 5x, x \to 0 \Rightarrow t \to 0] =$$

$$= \lim_{t\to 0} \frac{tg t}{\frac{2}{5}t} = \lim_{t\to 0} \frac{5}{2} \cdot \lim_{t\to 0} \frac{tg(t)}{t} =$$

$$= [tg x \sim x, x \to 0] = \frac{5}{2} \cdot \lim_{t\to 0} \frac{t}{t} = \frac{5}{2} \cdot \lim_{t\to 0} 1 = \underline{\frac{5}{2}}$$

6.4.61

$$\lim_{x\to 0}\frac{\ln(1+2x)}{\arcsin 3x}=\left[\frac{0}{0}\right]=\left[\ln(1+x)\sim x,\ \arcsin x\sim x,\ x\to 0\right]=\lim_{x\to 0}\frac{2x}{3x}=\lim_{x\to 0}\frac{2}{3}=\underline{\frac{2}{3}}$$

6.4.62

$$\lim_{x\to 0}\frac{e^{2x}-1}{\ln(1-6x)}=\left[\frac{0}{0}\right]=\left[e^{x}-1\sim x,\ \ln(1+x)\sim x,\ x\to 0\right]=\lim_{x\to 0}\frac{2x}{-6x}=\lim_{x\to 0}\frac{1}{-3}=\underline{-\frac{1}{3}}$$

6.4.63

$$\lim_{x\to 0}\frac{7^{x}-1}{3^{x}-1}=\left[\frac{0}{0}\right]=\left[a^{x}-1\sim x\cdot\ln a,\ x\to 0\right]=$$

$$=\lim_{x\to 0}\frac{x\cdot\ln 7}{x\cdot\ln 3}=\lim_{x\to 0}\frac{\ln 7}{\ln 3}=\lim_{x\to 0}\log_3 7=\underline{\log_3 7}$$

6.4.64

$$\lim_{x\to 0}\frac{\sqrt{1+7x}-1}{x}=\left[\frac{0}{0}\right]=\left[\sqrt[n]{1+x}-1\sim\frac{x}{n},\ x\to 0\right]=$$

$$=\lim_{x\to 0}\frac{\frac{7x}{2}}{x}=\lim_{x\to 0}\frac{7}{2}=\frac{7}{2}=\underline{3{,}5}$$

6.4.65

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

$$\cdot\lim_{x\to 2}\frac{\operatorname{arctg}(x-2)}{x-2}=\left[t=x-2,\ x\to 2\Rightarrow t\to 0\right]=$$

$$=\frac{1}{2}\cdot\lim_{t\to 0}\frac{\operatorname{arctg}(t)}{t}=\left[\operatorname{arctg}x\sim x,\ x\to 0\right]=$$

$$=\frac{1}{2}\cdot\lim_{t\to 0}\frac{t}{t}=\frac{1}{2}\cdot\lim_{t\to 0}1=\frac{1}{2}\cdot 1=\underline{0{,}5}$$