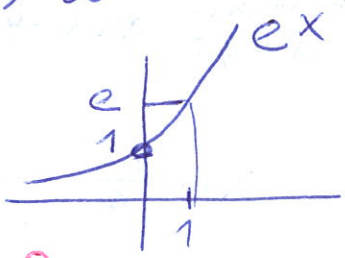
Z grafu funkce určete limity:

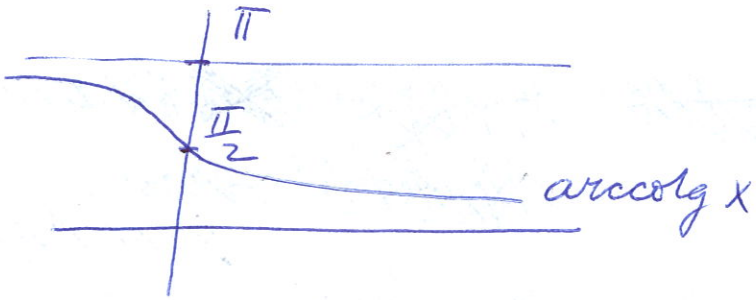
a) $\lim_{x\to\infty} e^x = \infty$ $\lim_{x\to-\infty} e^x = 0$ $\lim_{x\to 0} e^x = 1$

$\lim_{x\to 1} e^x = e$



b) $\lim_{x\to\infty} \operatorname{arccolg} x = 0$ $\lim_{x\to-\infty} \operatorname{arccolg} x = \pi$

$\lim_{x\to 0} \operatorname{arccolg} x = \frac{\pi}{2}$ $\lim_{x\to 1} \operatorname{arccolg} x = \operatorname{arccolg} 1 = \frac{\pi}{4}$



Vypočtěte:

a) $\lim_{x\to\infty} e^{\frac{2x}{x^2-1}} = e^0 = 1$ složená funkce

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

b) $\lim_{x\to\infty} \frac{3x^4-2}{2x^4+x+3} = \lim_{x\to\infty} \frac{x^4(3-\frac{2}{x^4})}{x^4(2+\frac{1}{x^3}+\frac{3}{x^4})} = \frac{3}{2}$

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

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

$D = 49 \Rightarrow x_{1,2} = \frac{-5\pm 7}{4} < \begin{matrix}-3\\ \frac{2}{4}=\frac{1}{2}\end{matrix}$

$= \lim_{x\to-3^+} \frac{1}{x+3} \cdot \lim_{x\to-3^+} \frac{2-x}{2(x-\frac{1}{2})} = \frac{1}{0^+} \cdot \frac{5}{2(-3-\frac{1}{2})} =$

$+ \leftarrow (x+3) > 0$ na -3

$= \infty \cdot \frac{5}{2\cdot(-\frac{7}{2})} = \infty\cdot(-\frac{5}{7}) = -\infty$

d) $\lim_{x\to 4^+} \ln \frac{3x+1}{x^2-4x} = \ln „\infty" = \infty$ ($\lim_{x\to\infty} \ln x$)

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

$4 \quad (x-4)>0$

$= \frac{1}{0^+} \cdot \frac{3\cdot 4+1}{4} = \infty \cdot \frac{13}{4} = \infty$

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

$= -\infty \cdot (-\infty)^2 = -\infty \cdot (+\infty) = -\infty$

lim jen pro první člen

!! $\lim_{x\to -\infty} x^3-x+2 = (-\infty)^3 - x + 2 =$

$= -\infty - x + 2$

špatný zápis, pokud chceme limitu z celého výrazu (x^3-x+2)