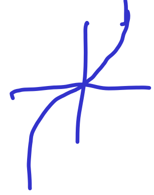
$\arccos(y) = x$

$\cos x = y$

Start 7:42



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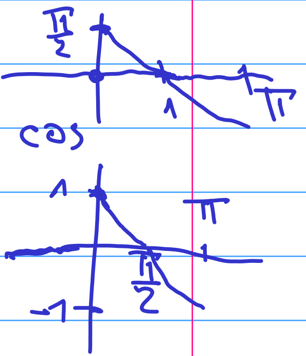


$$\lim_{x\to 0_+} \frac{\overbrace{\ln\left(\frac{2}{\pi}\arccos(x)\right)}^{0}}{\underbrace{\sqrt{x}}_{0}} \cdot \frac{e^{tg(\sqrt{\sin(x)})}-1}{\underbrace{\sin x}_{0}} \quad \neq 0$$

$$\lim_{y\to 0}\frac{\ln(y+1)}{y} = \lim_{x\to 0}\frac{e^{x}-1}{x} = 1$$

$$\lim_{x\to 0_+} \frac{\left(\frac{2}{\pi}\arccos(x)-1\right)}{\frac{2}{\pi}\arccos(x)-1}\cdot \ln\left(\frac{2}{\pi}\arccos(x)-1+1\right)\cdot \frac{e^{tg(\sqrt{\sin x})}-1}{\sqrt{x}\cdot \sin x}$$

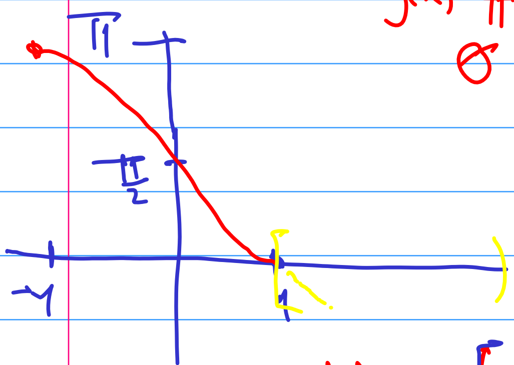
VOLSF $\lim_{x\to 0_+} \frac{2}{\pi}\arccos(x)-1 = 0$

$\lim_{x\to a} g(a)=b$

$\lim_{y\to b} f(y)=c$

omilimi je "prostý na okolí a" $\equiv \exists H_a : \forall x \in H_a \cap D_g : g(x)=g(a) \Rightarrow x=a$

$g(x)=\frac{2}{\pi}\arccos(x)-1$ nenabývá 0 na okolí 0 vyjma $x=0$



$\cos(0)=1$

$\cos(\frac{\pi}{2})=0$

$\cos(\pi)=-1$

spojitá na $[-1,1]$

spojitá zleva v $+1$ / zprava v -1

$$\lim_{x_0} A\cdot B = \underbrace{\lim_{x_0} A}\cdot\underbrace{\lim_{x_0} B}$$

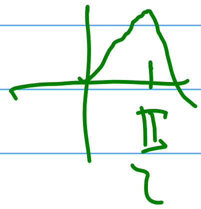
1.

$$\lim_{x\to 0_+}\left[\frac{2}{\pi}\arccos(x)-1\right]\cdot\frac{e^{tg(\sqrt{\sin x})}-1}{\sqrt{x}\cdot\sin x}$$

$$\lim_{x\to 0^+} \frac{e^{tg(\sqrt{\sin x})} - 1}{tg(\sqrt{\sin x})} \cdot \frac{tg(\sqrt{\sin x})\left[\frac{2}{\pi}\arccos(x) - 1\right]}{\sqrt{x}\cdot \sin x}$$

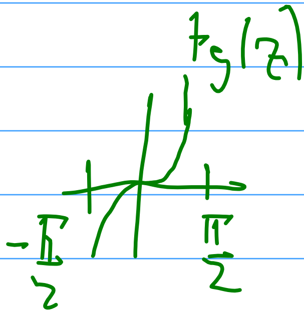
VOLSF

① $f(y) = \dfrac{e^y - 1}{y}$ ② $g(x) = tg(\sqrt{\sin x})$



$\lim_{y\to 0} f(y) = 1$ $\lim_{x\to 0^+} g(x) \overset{\text{VOLSF 2}}{=} 0$

③ $g(x)$ prostá na pravém okolí 0 např. $(0, \pi/2)$



$z = \sqrt{\sin x}$

$x \in (0, \pi/2)$

$$= \lim_{x\to 0^+} \frac{tg(\sqrt{\sin x})\left[\frac{2}{\pi}\arccos(x) - 1\right]}{\sqrt{x}\cdot \sin x}$$

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

$$= \lim_{x\to 0^+} \frac{\frac{2}{\pi}\arccos(x) - 1}{\sqrt{x\cdot \sin x}\cdot\cos(\sqrt{\sin x})}$$

$$= \lim_{x\to 0^+} \frac{\sqrt{x}\left(\frac{2}{\pi}\arccos(x) - 1\right)}{x\cdot\sqrt{\sin x}\cdot\cos(\sqrt{\sin x})}$$

$$= \lim_{x \to 0+} \frac{\frac{2}{\pi}\arccos(x) - 1}{x \cdot \cos(\sqrt{\sin x})}$$

$$\lim_{x \to 0+} \frac{1}{\cos(\sqrt{\sin x})} = 1$$

$$= \frac{2}{\pi} \boxed{\lim_{x \to 0+} \frac{\cancel{\frac{2}{\pi}}\arccos(x) - \frac{\pi}{2}}{\underbrace{x}}} \overset{L'H}{=} \lim_{x \to 0+} -\frac{2}{\pi}\frac{1}{\sqrt{1-x^2}} = -2/\pi$$

$$\lim_{x \to 0+} \ln\left[\frac{2}{\pi}\arccos(x)\right]\left(\frac{e^{\ln\left[\frac{2}{\pi}\arccos(x)\right]} - 1}{x \cdot \ln\left[\frac{2}{\pi}\arccos(x)\right]}\right)$$

$$\| $$

$$\lim_{x \to 0+} \frac{\ln\left[\frac{2}{\pi}\arccos(x)\right]}{x}$$

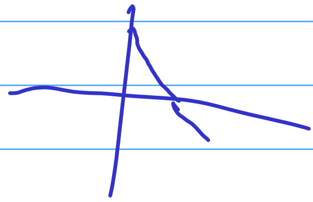
10.17:

a) $\lim\limits_{x\to 0} \frac{\arcsin x}{x} = 1$

$\| \quad x = \sin y$

$\lim\limits_{y\to 0} \frac{\arcsin(\sin(y))}{\sin(y)} = \lim\limits_{y\to 0} \frac{y}{\sin y} = 1$

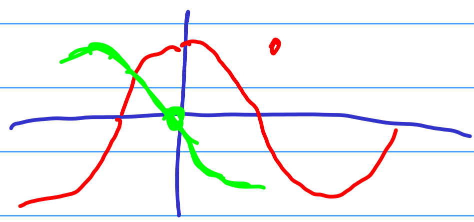
b) $\lim\limits_{x\to 0} \frac{\arccos(x) - \pi/2}{x}$



$x = \cos y \qquad \cos y \to 0 \qquad y \to \pi/2$

$\lim\limits_{y\to \pi/2} \frac{y - \pi/2}{\cos(y)} = -1 \times \underbrace{\lim\limits_{y\to \pi/2} \frac{\pi/2 - y}{\sin(\pi/2 - y)}}_{=1}$

$\cos(y) = \sin\left(\frac{\pi}{2} - y\right)$



$= -1$

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

$$\frac{e^{\frac{\sin\sqrt{\sin x}}{\cos\left(\sqrt{\sin x}\right)}} - 1}{\sqrt{x}\cdot\sin x}$$

$$\lim_{x\to 0^+} \frac{e^{\frac{\sin\left(\frac{\sqrt{\sin x}}{\sqrt{x}}\cdot\sqrt{x}\right)}{\cos\left(\sqrt{\sin x/x}\cdot\sqrt{x}\right)}} - 1}{\sqrt{x}\cdot\sin x} \quad \text{- - - -} \quad 0$$