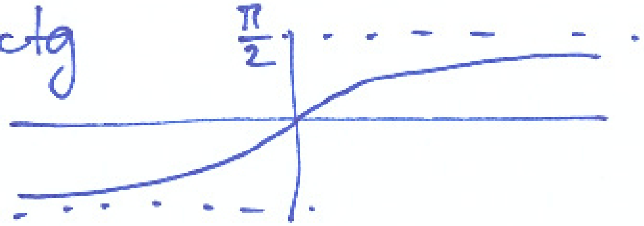
Konzultace 27.11.

arctg



z DÚ 3:

$$f(x) = \operatorname{arctg}\left(1 + \frac{1}{x^2}\right)$$

D_f: $\underline{\underline{x \neq 0}}$

$$\lim_{x\to 0} f(x) = \lim \operatorname{arctg}\left(1 + \underbrace{\frac{1}{x^2}}_{\to +\infty}\right) = \frac{\pi}{2}$$

$\Rightarrow$ dodef. $g(0) := \frac{\pi}{2}$

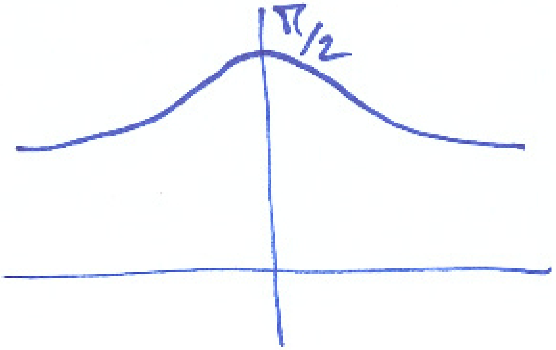
$g(x) := f(x)$ pro $x \neq 0$

Derivace: pro $x \neq 0$:

$$g'(x) = \left(\operatorname{arctg}\left(\frac{x^2+1}{x^2}\right)\right)' =$$

$$= \frac{1}{\left(\frac{x^2+1}{x^2}\right)^2 + 1}\left(\frac{-2}{x^3}\right) = \underline{\underline{\frac{-2\cdot \cancel{x^4}\, x}{(x^4+2x^2+2)\cancel{x^3}}}}$$

$$g'(0) = \lim_{x\to 0} g'(x) = \underline{\underline{0}}$$



$$g'(0) = \lim_{x\to 0} \frac{g(x) - g(0)}{x - 0} = \lim_{x\to 0} \frac{\operatorname{arctg}\left(1 + \frac{1}{x^2}\right) - \frac{\pi}{2}}{x} =$$

$$\stackrel{L'H}{=} \lim_{x\to 0} \frac{f'(x)}{1}$$

Cv. 6 Př 8

$I = \int e^{3x} \cos 2x \, dx = \; \dots \;$ něco + konst. I

$f' = \cos 2x \qquad f = \frac{1}{2}\sin 2x$

Př $\int e^{x^2} dx$

Cv. 6 11, 12, 13 – lze přes $y = \operatorname{tg}\frac{x}{2}$

$t = \sin x: \int \frac{dt}{t^2} = -\frac{1}{t}$

11 $\int \frac{dx}{1+\cos x} = \int \frac{1-\cos x}{1-\cos^2 x} dx = \int \frac{1}{\sin^2 x} dx - \int \frac{\cos x}{\sin^2 x} dx =$

$= -\cot g\, x + \frac{1}{\sin x}$

13 $\int \frac{dx}{\sin x \cdot \cos^3 x} = \int \frac{\cos^2 x + \sin^2 x}{\sin x \cdot \cos^3 x} dx = \int \frac{1}{\sin x \cos x} dx + \int \frac{\sin x}{\cos^3 x} dx =$

$u = \cos x$

$du = -\sin x \, dx$

$= 2 \int \frac{1}{\sin 2x} dx$

viz 12

~~$y = \sin 2x$~~

~~$dy = 2\cos 2x$~~

11 jinak

$$\int \frac{dx}{1+\cos x} = \int \frac{1}{1+\left(-1+2\cos^2\frac{x}{2}\right)}\,dx = \int \frac{\frac{1}{2}dx}{\cancel{2}\cos^2\frac{x}{2}} = \underline{\underline{\operatorname{tg}\left(\frac{x}{2}\right)}} \overset{?}{=} -\operatorname{cotg} x + \frac{1}{\sin x} = \frac{1-\cos x}{\sin x}$$

$x \neq \pi + 2k\pi$

$$\boxed{\begin{aligned}\cos 2x &= \cos^2 x - \sin^2 x = \\ &= 2\cos^2 x - 1\end{aligned}}$$

$x \neq \pi + 2k\pi$

$x \neq k\pi$

+ spojité dodef. v $2k\pi$