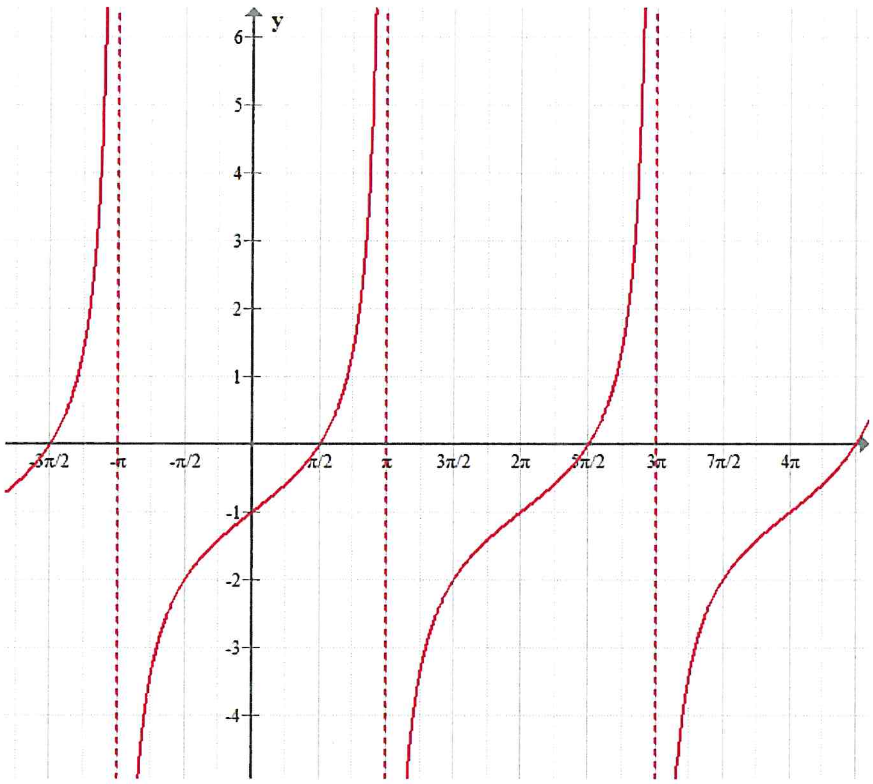
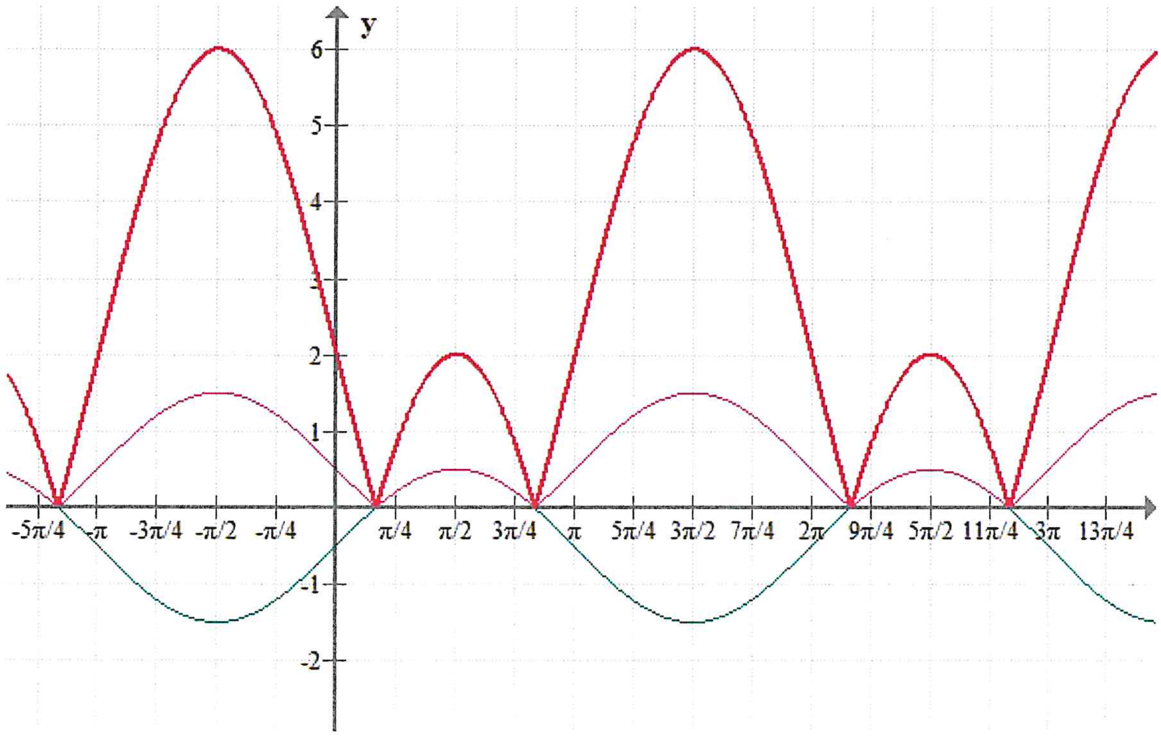
MATEMATIKA 20.6.2022

1. Sestrojte grafy, uveďte vlastnosti

$$f: y = tg\left(\frac{1}{2}x\right) - 1$$

$$g: y = 4.\left|sinx - \frac{1}{2}\right|$$





Cvičení 11:

Zjednodušte, uveďte podmínky:

8. $sinx + cosxtgx$
9. $sinxcosx(tgx + cotgx)$
10. $\frac{sinx}{1+cosx} + \frac{sinx}{1-cosx}$
11. $cotgx + \frac{sinx}{1+cosx}$
12. $(sinx + cosx)^2 + (sinx - cosx)^2$
13. $\frac{sinxcos2x}{cosxsin2x}$
14. $\frac{cos^2 2x-1}{sin^2 2x-1}$

8) $= \sin x + \cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} = \underline{\underline{2 \cdot \sin x}}$ $\quad \underline{x \neq \frac{\pi}{2} + k\pi;\ k \in Z}$

9) $= \sin x \cdot \cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} + \cancel{\sin x} \cdot \cos x \cdot \frac{\cos x}{\cancel{\sin x}} =$

$= \sin^2 x + \cos^2 x = \underline{\underline{1}}$ $\quad \underline{x \neq k \cdot \frac{\pi}{2};\ k \in Z}$

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

$= \underline{\underline{\frac{2}{\sin x}}}$ $\quad \underline{x \neq k \cdot \pi;\ k \in Z}$

11) $= \frac{\cos x}{\sin x} + \frac{\sin x}{1+\cos x} = \frac{\cos x + \cos^2 x + \sin^2 x}{\sin x(1+\cos x)} =$

$= \frac{\cancel{\cos x + 1}}{\sin x(\cancel{1+\cos x})} = \underline{\underline{\frac{1}{\sin x}}}$ $\quad \underline{x \neq k \cdot \pi;\ k \in Z}$

12) $= \sin^2 x + \cancel{2 \cdot \sin x \cdot \cos x} + \cos^2 x + \sin^2 x \cancel{- 2 \cdot \sin x \cdot \cos x} + \cos^2 x =$

$= 2 \cdot \sin^2 x + 2 \cdot \cos^2 x = 2(\sin^2 x + \cos^2 x) = \underline{\underline{2}}$

$\underline{x \in R}$

13) $= \dfrac{\sin x\,(\cos^2 x - \sin^2 x)}{\cos x \cdot 2 \cdot \sin x \cdot \cos x} = \dfrac{\sin x \cdot \cos^2 x - \sin^3 x}{2 \cdot \sin x \cdot \cos^2 x} =$

$= \dfrac{\cancel{\sin x \cdot \cos^2 x}}{\cancel{2 \cdot \sin x \cdot \cos^2 x}} - \dfrac{\sin^{\cancel{3}\,2} x}{2 \cdot \cancel{\sin x} \cdot \cos^2 x} = \dfrac{1}{2} - \dfrac{1}{2} \cdot \operatorname{tg}^2 x =$

$= \dfrac{1}{2}\left(1 - \operatorname{tg}^2 x\right)$ $\qquad x \neq k \cdot \dfrac{\pi}{2};\ k \in Z$

14) $= \dfrac{-\sin^2 2x}{-\cos^2 2x} = \operatorname{tg}^2 2x$

$\sin 2x \neq \pm 1$

$2x \neq \dfrac{\pi}{2} + k\pi$

$x \neq \dfrac{\pi}{4} + k \cdot \dfrac{\pi}{2}$

$k \in Z$

$\sin^2 t + \cos^2 t = 1 \Rightarrow \sin^2 t - 1 = -\cos^2 t$

$\cos^2 t - 1 = -\sin^2 t$