

Zadatak 6. Prikaži grafički funkcije:

1) $f(x) = 2 \operatorname{ctg} \frac{1}{2}x$;

2) $f(x) = -\operatorname{ctg} 2x$;

3) $f(x) = \operatorname{ctg}(x - \frac{\pi}{4})$;

4) $f(x) = -\frac{1}{2} \operatorname{ctg}(\pi - 4x)$.

Rješenje. 1) $f(x) = 2 \operatorname{ctg} \frac{1}{2}x$;

vertikalne asimptote:

$$\operatorname{ctg} \frac{1}{2}x = \pm\infty$$

$$\frac{1}{2}x = k\pi \quad / \cdot 2$$

$$x = 2k\pi$$

nultočke:

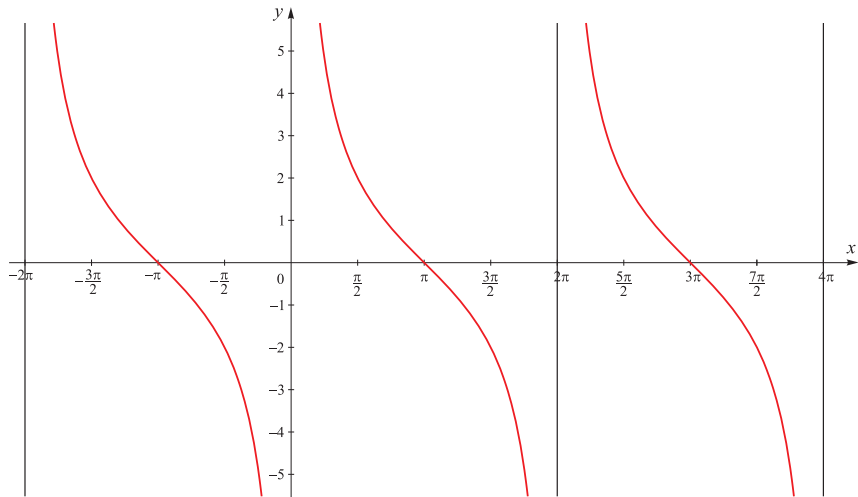
$$\operatorname{ctg} \frac{1}{2}x = 0$$

$$\frac{1}{2}x = \frac{\pi}{2} + k\pi \quad / \cdot 2$$

$$x = \pi + 2k\pi$$

period:

$$P = \frac{\pi}{\frac{1}{2}} = 2\pi$$



2) $f(x) = -\operatorname{ctg} 2x$;

vertikalne asimptote:

$$\operatorname{ctg} 2x = \pm\infty$$

$$2x = k\pi \quad / \cdot 2$$

$$x = \frac{k\pi}{2}$$

nultočke:

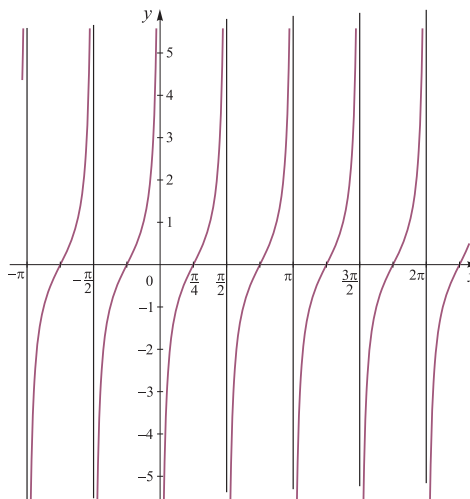
$$\operatorname{ctg} 2x = 0$$

$$2x = \frac{\pi}{2} + k\pi \quad / : 2$$

$$x = \frac{\pi}{4} + \frac{k\pi}{2}$$

period:

$$P = \frac{\pi}{2}$$



$$3) f(x) = \text{ctg}\left(x - \frac{\pi}{4}\right);$$

vertikalne asimptote:

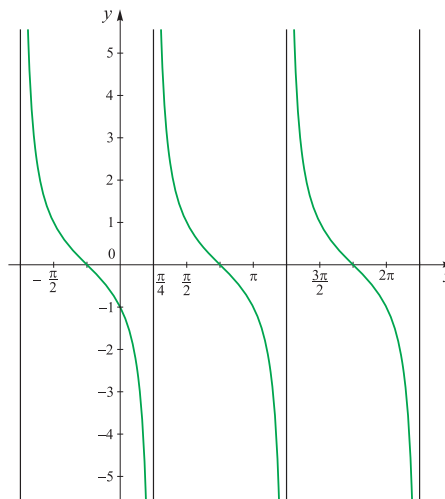
$$\begin{aligned} \text{ctg}\left(x - \frac{\pi}{4}\right) &= \pm\infty \\ x - \frac{\pi}{4} &= k\pi \\ x &= \frac{\pi}{4} + k\pi \end{aligned}$$

nultočke:

$$\begin{aligned} \text{ctg}\left(x - \frac{\pi}{4}\right) &= 0 \\ x - \frac{\pi}{4} &= \frac{\pi}{2} + k\pi \\ x &= \frac{3\pi}{4} + k\pi \end{aligned}$$

period:

$$P = \frac{\pi}{1} = \pi$$



$$4) f(x) = -\frac{1}{2} \operatorname{ctg}(\pi - 4x) = -\frac{1}{2} \operatorname{ctg}\left[-4\left(x - \frac{\pi}{4}\right)\right] = \frac{1}{2} \operatorname{ctg} 4\left(x - \frac{\pi}{4}\right).$$

vertikalne asimptote:

$$\operatorname{ctg} 4\left(x - \frac{\pi}{4}\right) = \pm\infty$$

$$4\left(x - \frac{\pi}{4}\right) = k\pi \quad / : 4$$

$$x - \frac{\pi}{4} = \frac{k\pi}{4}$$

$$x = \frac{\pi}{4} + \frac{k\pi}{4}$$

nultočke:

$$\operatorname{ctg} 4\left(x - \frac{\pi}{4}\right) = 0$$

$$4\left(x - \frac{\pi}{4}\right) = \frac{\pi}{2} + k\pi \quad / : 4$$

$$x - \frac{\pi}{4} = \frac{\pi}{8} + \frac{k\pi}{4}$$

$$x = \frac{3\pi}{8} + \frac{k\pi}{4}$$

period:

$$P = \frac{\pi}{4}$$

