

**Zadatak 7.** Prikaži grafički funkcije:

$$1) f(x) = -\frac{1}{2} \sin\left(4x - \frac{2\pi}{3}\right);$$

$$2) f(x) = 2 \cos\left(3x + \frac{\pi}{2}\right);$$

$$3) f(x) = -3 \sin(2|x| + \pi);$$

$$4) f(x) = \frac{1}{2} \cos\left|x + \frac{\pi}{3}\right|.$$

**Rješenje.** 1)  $f(x) = -\frac{1}{2} \sin\left(4x - \frac{2\pi}{3}\right) = -\frac{1}{2} \sin 4\left(x - \frac{\pi}{6}\right)$   
 $C = -\frac{1}{2}, \quad P = \frac{2\pi}{4} = \frac{\pi}{2}$

nultočke:

$$\sin 4\left(x - \frac{\pi}{6}\right) = 0$$

$$4\left(x - \frac{\pi}{6}\right) = k\pi \quad / : 4$$

$$x - \frac{\pi}{6} = \frac{k\pi}{4}$$

$$x = \frac{3k+2}{12}\pi, \quad k \in \mathbf{Z}$$

maksimum ( $C < 0$ )

$$\sin 4\left(x - \frac{\pi}{6}\right) = -1$$

$$4\left(x - \frac{\pi}{6}\right) = \frac{3\pi}{2} + 2k\pi \quad / : 4$$

$$x - \frac{\pi}{6} = \frac{3\pi}{8} + \frac{k\pi}{2}$$

$$x = \frac{13+12k}{24}\pi, \quad k \in \mathbf{Z}$$

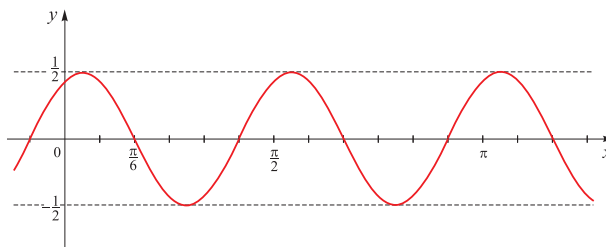
minimum ( $C < 0$ )

$$\sin 4\left(x - \frac{\pi}{6}\right) = 1$$

$$4\left(x - \frac{\pi}{6}\right) = \frac{\pi}{2} + 2k\pi \quad / : 4$$

$$x - \frac{\pi}{6} = \frac{\pi}{8} + \frac{k\pi}{2}$$

$$x = \frac{7+12k}{24}\pi, \quad k \in \mathbf{Z}$$



$$2) f(x) = 2 \cos\left(3x + \frac{\pi}{2}\right) = -2 \sin 3x, \quad C = -2, \quad P = \frac{2\pi}{3}$$

nultočke:

$$-2 \sin 3x = 0$$

$$3x = k\pi \quad / : 3$$

$$x = \frac{k\pi}{3}, \quad k \in \mathbf{Z}$$

maksimum ( $C < 0$ )

$$\sin 3x = -1$$

$$3x = \frac{3\pi}{2} + 2k\pi \quad / : 3$$

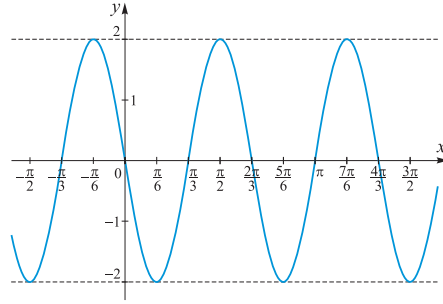
$$x = \frac{\pi}{2} + \frac{2k\pi}{3}, \quad k \in \mathbf{Z}$$

minimum ( $C < 0$ )

$$\sin 3x = 1$$

$$3x = \frac{\pi}{2} + 2k\pi \quad / : 3$$

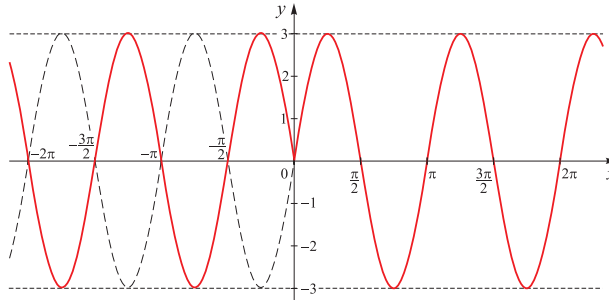
$$x = \frac{\pi}{6} + \frac{2k\pi}{3}, \quad k \in \mathbf{Z}$$



$$3) f(x) = -3 \sin(2|x| + \pi) = -3 \sin(2|x| + \pi) = 3 \sin 2|x| \begin{cases} 3 \sin 2x, x \geq 0 & \dots f_1 \\ -3 \sin 2x, x \leq 0 & \dots f_2 \end{cases}$$

$$f_1 \quad \dots \quad N = 0, \quad C = 3, \quad P = \frac{2\pi}{2} = \pi.$$

Graf funkcije  $f_2$  je simetričan grafu funkcije  $f_1$  za  $x < 0$  s obzirom na os apscisa.



$$4) f(x) = \frac{1}{2} \cos |x + \frac{\pi}{3}| = \frac{1}{2} \cos(x + \frac{\pi}{3}) \quad (\cos \text{ je parna funkcija}).$$

$$f(x) = \frac{1}{2} \cos(x + \frac{\pi}{3}) = \frac{1}{2} \sin(x + \frac{\pi}{3} + \frac{\pi}{2}) = \frac{1}{2} \sin(x + \frac{5\pi}{6});$$

$$N = -\frac{5\pi}{6}, \quad C = \frac{1}{2}, \quad P = 2\pi;$$

