

**Zadatak 14.** Dane su funkcije  $f(x) = \operatorname{sgn} x$ ,  $g(x) = |x|$ ,  $k(x) = 2x^2 - 5x - 3$ . Odredi funkcije  $f \circ k$ ,  $k \circ f$ ,  $g \circ k$ ,  $k \circ g$  te ih prikaži grafički.

*Rješenje.*

$$f(x) = \operatorname{sgn}(x) = \begin{cases} 1, & x > 0 \\ 0, & x = 0 \\ -1, & x < 0 \end{cases}$$

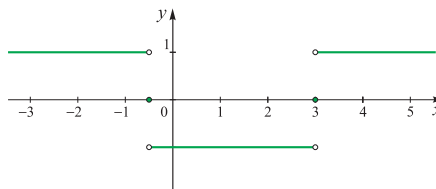
$$g(x) = |x| = \begin{cases} x, & x > 0 \\ 0, & x = 0 \\ -x, & x < 0 \end{cases}$$

$$k(x) = 2x^2 - 5x - 3 = (x-3)(2x+1), \begin{cases} k(x) > 0, & x \in \left\langle -\infty, -\frac{1}{2} \right\rangle \cup \langle 3, \infty \rangle \\ k(x) = 0, & x = -\frac{1}{2} \text{ ili } x = 3 \\ k(x) < 0, & x \in \left\langle -\frac{1}{2}, 3 \right\rangle \end{cases}$$

Pogledajmo sada tražene kompozicije:

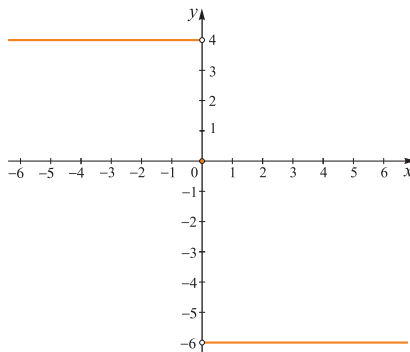
$$\underline{(f \circ k)(x)}$$

$$f[k(x)] = \begin{cases} 1, & x \in \left\langle -\infty, -\frac{1}{2} \right\rangle \cup [3, \infty) \\ -1, & x \in \left\langle -\frac{1}{2}, 3 \right\rangle \end{cases}$$



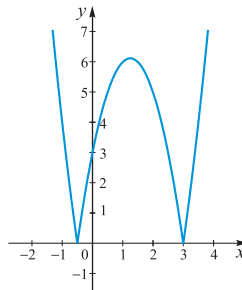
$$\underline{(k \circ f)(x)}$$

$$k[f(x)] = 2(\operatorname{sgn}(x))^2 - 5\operatorname{sgn}(x) - 3 = \begin{cases} 2 - 5 - 3 = -6, & x > 0 \\ -3, & x = 0 \\ 2 + 5 - 3 = 4, & x < 0 \end{cases}$$



$(k \circ f)(x)$

$$g[k(x)] = |2x^2 - 5x - 3| = \begin{cases} 2x^2 - 5x - 3, & x \in \langle -\infty, -\frac{1}{2} \rangle \cup [3, \infty) \\ -2x^2 + 5x + 3, & x \in \langle -\frac{1}{2}, 3 \rangle \end{cases}$$



$(f \circ k)(x)$

$$k[g(x)] = 2(|x|)^2 - 5|x| - 3 = \begin{cases} 2x^2 - 5x - 3, & x \geq 0 \\ 2x^2 + 5x - 3, & x < 0 \end{cases}$$

