Zadatak 17. U skupu $\mathbf{R}$ riješi jednadžbu $(f \circ g)(x) = x$ ako je:

1) $f(x) = |x+1| - |2x-1|$, $g(x) = x+2$;

2) $f(x) = |x| - 4$, $g(x) = x^2 - 2x$.

Rješenje. **1)** $(f \circ g)(x) = |x+3| - |2(x+2)-1| = |x+3| - |2x+3|$

		-3	$-\frac{3}{2}$
$\lvert x+3\rvert$	$-$	$+$	$+$
$\lvert 2x+3\rvert$	$-$	$-$	$+$

$\underline{x \in -\infty, -3\rangle} \implies$

$$\begin{aligned} -x-3+2x+3 &= x, \\ 0 &= 0, \\ x &\in -\infty, -3\rangle; \end{aligned}$$

$\underline{x \in \left[-3, -\frac{3}{2}\right]} \implies$

$$\begin{aligned} x+3+2x+3 &= x, \\ 2x &= -6, \\ x &= -3; \end{aligned}$$

$\underline{x \in \left\langle -\frac{3}{2}, \infty\right\rangle} \implies$

$$\begin{aligned} x+3-2x-3 &= x, \\ x &= 0; \end{aligned}$$

Rješenja su $x \leqslant -3$ ili $x = 0$;

2) $(f \circ g)(x) = |x^2 - 2x| - 4$;

$x^2 - 2x \geqslant 0 \implies x \in \langle -\infty, 0] \cup [2, \infty\rangle$

$\underline{x \in \langle -\infty, 0] \cup [2, \infty\rangle}$

$$\begin{aligned} x^2 - 2x - 4 &= x \\ x^2 - 3x - 4 &= 0 \\ x^2 + x - 4x - 4 &= 0 \\ (x+1)(x-4) &= 0 \\ x_1 = -1, \quad x_2 &= 4 \end{aligned}$$

$\underline{x \in \langle 0, 2\rangle}$

$$\begin{aligned} -x^2 + 2x - 4 &= x \\ x^2 - x + 4 &= 0 \\ &\emptyset \end{aligned}$$

Rješenja su $x_1 = -1$, $x_2 = 4$.