6. Systems of inequalities

Exercise material

Exercise

Solve the following inequalities:

1. $\dfrac{x-4}{x-1} > 2;$
2. $\dfrac{4x+6}{3x+1} \geq 0;$
3. $x^7 - x \geq 0;$
4. $\sqrt{2x+3} > \sqrt{4x^2-2x-6};$
5. $\begin{cases} \dfrac{x}{x-1} > 2 \\ \dfrac{x-1}{x-2} \geq 0. \end{cases}$

Exercise

Determine, as the real parameter k varies, the solutions to the following inequalities:

1. $kx \geq 2$;
2. $\dfrac{kx-1}{x+2} \geq 3(x-5)$.

Exercise

1. *Given the polynomial* $P(x) = x^2 + ax + b$ *with* $a, b \in \mathbb{R}$*, solve the equation* $P(x) = 0$ *knowing that* $P(1) = 1$ *and* $P(-1) = -1$*;*

2. *Given the polynomial* $P(x) = x^2 + ax + b$ *with* $a, b \in \mathbb{R}$*, determine the sign (i.e.,* $P(x) \geq 0$ *or* $P(x) < 0$*) of the polynomial* $P(x)$ *as a and b vary, given that* $P(1) = 0$*.*