Ex. 1 Solve inequalities:

a) $\frac{|x-1|}{|x+1|} \leq 1$

b) $\sqrt{x^2} > x + 1$

Ex. 2 Find the range of $f(x) = \sqrt{x} - 31$ where: (a) $x \in [1, 2]$, (b) $x \in [0, 1]$.

Ex. 3 Find the inverse f^{-1} of the function f, where $f(x) = 2^{x+1}$ and the domain of f is $D_f = \mathbf{R}$. Find the domain $D_{f^{-1}}$ of the inverse.

Ex. 4 Solve the inequalities:

a) $\sqrt[3]{5 - x} < -2$

b) $\sqrt{8 - x} > x - 6$

Ex. 5 Solve:

a) $9^x + 5 \cdot 3^{x-\frac{1}{2}} = 2$

b) $2^{x+1} - 2^{x-1} \leq 3^{2-x}$

c) $\log_{\frac{1}{2}} x + \log_{\frac{1}{2}} \left(\frac{3}{4} - x\right) = 3$

Ex. 6 Draw two graphs of the logarithmic function $f(x) = \log_a x$, for various a (two cases). What is the domain D_f of f? Give a comment on monotonicity of f for these two cases. Explain the meaning of being a decreasing/increasing function in terms of inequalities between the arguments and between the values.

Ex. 7 For which $a \in \mathbf{R}$ the inequality $\sqrt{x} < a$ has no solutions? Why?

Ex. 8 Give the rule, which enables us to find an integral root of a polynomial

$$a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0,$$

if such a rule exists.