Exercise 1. Calculate:

a) $|2-x|$ for $x=-2$, $x=2$ and $x=4$,

b) $|x+1|$ for $x=0$ and $x=-\sqrt{2}$.

Exercise 2. Write down the formula for the following functions without using the modulus bars.

a) $f(x)=|x-3|$, b) $g(x)=|3-x|$, c) $h(x)=\frac{x^2-1}{|x-1|}$, d) $i(x)=\frac{|x^2-1|}{|x+1|}$.

Exercise 3. Solve the following equations.

a) $|x+3|=x+3$, b) $|x-2|=2-x$, c) $|x^2+4|=x^2+4$,
d) $\sqrt{(3x-2)^2}=2-3x$, e) $|3x^2+2x|=x|3x+2|$, f) $|6x-2|=10$,
g) $|9x|-11=x$, h) $|x-3|+|5-x|=6$, i) $\sqrt{x^2+2x+1}-2x=4$.

Exercise 4. Solve the following inequalities.

a) $|2x+6|\leq 4$, b) $|7-x|>15$, c) $|\frac{1}{x-1}|<2$,
d) $\frac{|x-1|}{|x+1|}\leq 1$, e) $||2x-1|-1|\leq 1$, f) $2-|1-2x|>1$,
g) $||x-2|-2|\geq 2$, h) $\frac{1}{|x-4|}<\frac{1}{|x+7|}$, i) $|2x+1|<2|x|$.

Exercise 5. Set the domains of the following functions.

a) $f(x)=\frac{1}{|x^2-4|-3x}$, b) $g(x)=\frac{2x}{\sqrt{5-||3-2x|-1|}}$, c) $h(x)=\sqrt{1-|x+1-|x||}$.

Exercise 6. Sketch the graphs and state whether the functions are odd or even:

$$a(x)=|x-3|+|x+3|,\quad b(x)=x\cdot|x|,\quad c(x)=\sin|x|+|\sin x|.$$

Exercise 7. Solve $|||x-1|-2|-3|>1$.

Exercise 8. On the Cartesian plane draw sets of points meeting the following conditions.

a) $|x|+|y|=1$, b) $y+|x+2|\geq 2$, c) $|x-y|+|x+y|=2$, d) $|x|-|y|\leq 1$.

Some exercises were taken from the script "Matematyka - podstawy z elementami matematyki wyższej" issued by the Gdańsk University of Technology publishing house.

Vocabulary - Absolute value

- absolute value - wartość bezwzględna
- absolute value bars, modulus bars - nawiasy typu | |
- modulus (*pl. moduli*) - moduł
- Cartesian plane - układ współrzędnych kartezjańskich