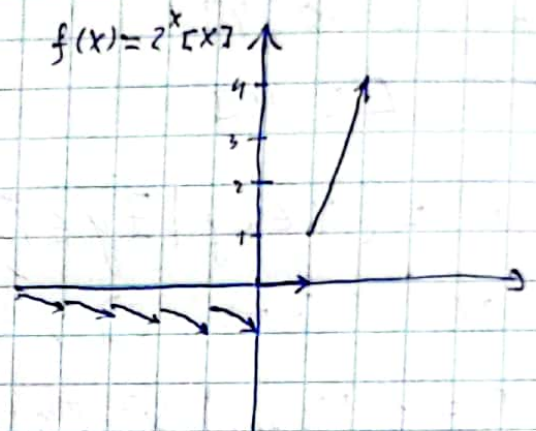
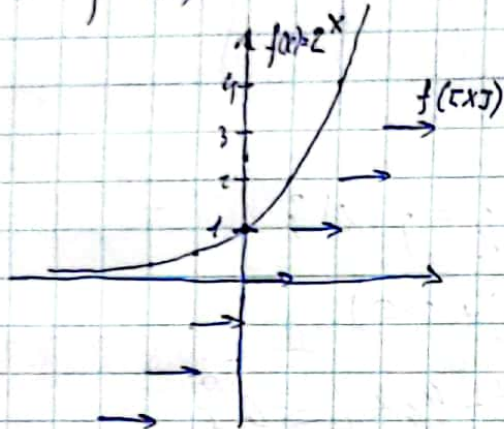
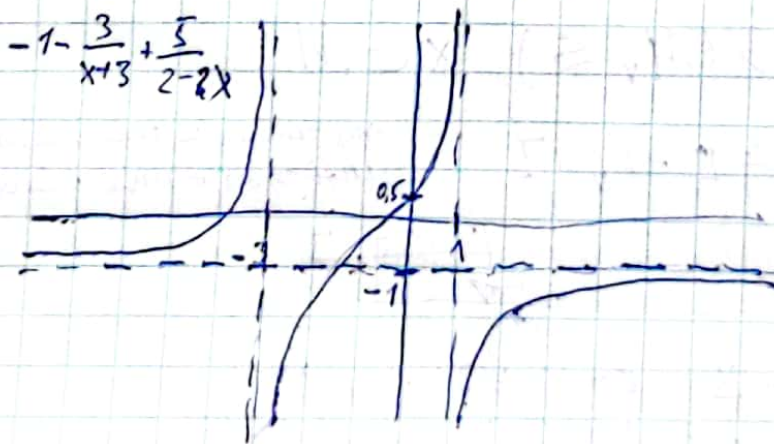
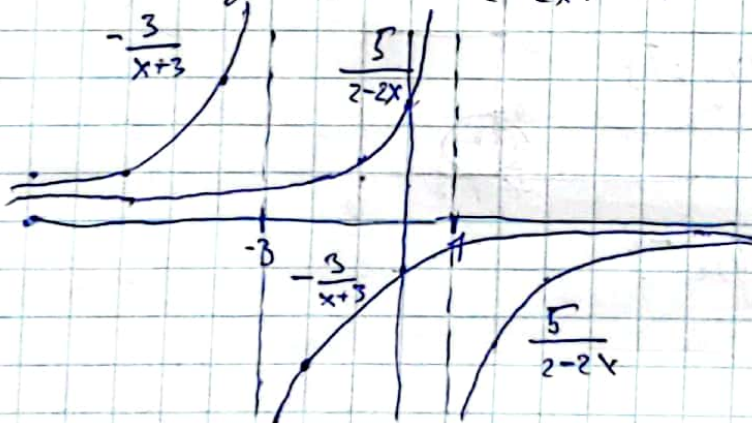


2.16  $f(x) = 2^x [x]$

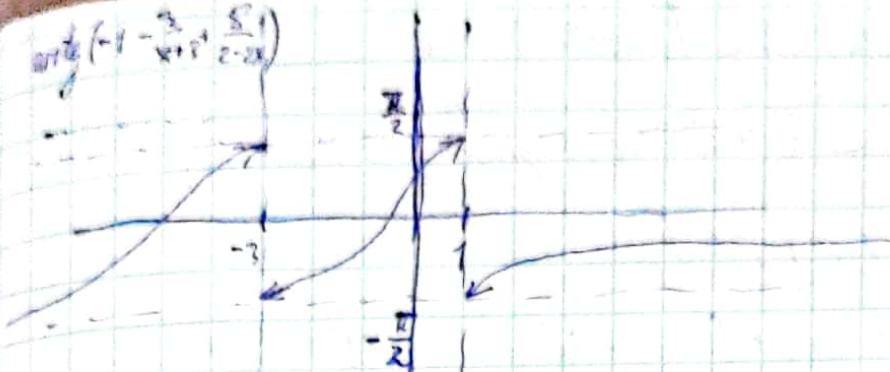


2.28  $f(x) = \ln \left( \operatorname{arctg} \left( \frac{2x+3}{x+3} + \frac{6x-1}{2-2x} \right) + \frac{\pi}{2} \right)$

$\ln \left( \operatorname{arctg} \left( \frac{2x+3}{x+3} + \frac{6x-1}{2-2x} \right) + \frac{\pi}{2} \right) = \ln \left( \operatorname{arctg} \left( -1 - \frac{3}{x+3} + \frac{5}{2-2x} \right) + \frac{\pi}{2} \right)$



$$\arg(-1 - \frac{3}{x+3} + \frac{5}{2+2x})$$



$$\arg(-1 - \frac{3}{x+3} + \frac{5}{2+2x}) + \frac{\pi}{2}$$



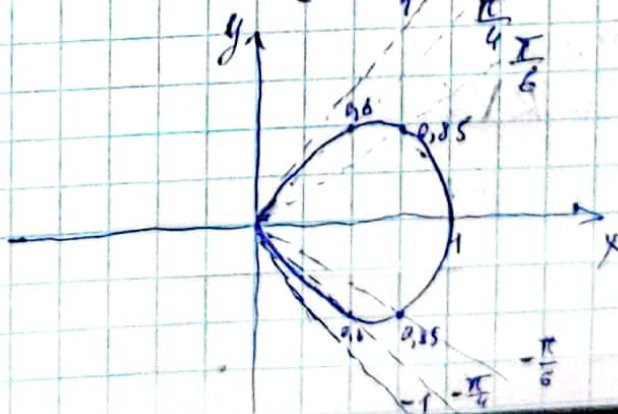
$$\arg(-1 - \frac{3}{x+3} + \frac{5}{2+2x}) + \frac{\pi}{2}$$



$$2.34 \quad r^2 + \varphi^2 = 1$$

$$r = \sqrt{1 - \varphi^2} \Rightarrow$$

$$\begin{cases} \varphi \leq 1 \quad (45^\circ) \\ \varphi \leq -1 \quad (-45^\circ) \end{cases}$$



$\varphi$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	1
$r$	1	0,85	0,6	0
$\varphi$	$-\frac{\pi}{4}$	$-\frac{\pi}{2}$	$-\frac{3\pi}{4}$	-1
$r$	0,85	0,6	0	0



$$3.1 \Gamma \subseteq \mathbb{Z} \times \mathbb{Z} \text{ ма } (x, y) \in \Gamma \Leftrightarrow x = y^2$$

$\Gamma = \{(x, y) \mid x = y^2\} \subseteq \mathbb{Z} \times \mathbb{Z}$  не е функционални,

До  $(1, 1) \in \Gamma$  ма  $(1, -1) \in \Gamma$

$$3.2 \Gamma \subseteq \mathbb{N} \times \mathbb{N} \text{ ма } (x, y) \in \Gamma \Leftrightarrow x^2 + y^2 = 25$$

$\Gamma = \{(x, y) \mid x^2 + y^2 = 25\} \subseteq \mathbb{N} \times \mathbb{N}$  е функционални,

До  $x \in \mathbb{N}$  ма  $y \in \mathbb{N}$  (график само  $y \geq 0$  координатний звороті)

$$3.5 f(x) = \frac{1}{\sin \pi x}, f: X \rightarrow Y$$

1)  $X = Y = \mathbb{R} \quad f: \mathbb{R} \rightarrow \mathbb{R}$

$D_f = \mathbb{R} \setminus \mathbb{Z}$  (би  $\mathbb{R}$  без  $y$  нулю)

$E_f = \mathbb{R} \setminus (-1, 1) = (-\infty, -1] \cup [1, +\infty)$

2)  $X = [-1, 1], Y = \mathbb{R} \quad f: [-1, 1] \rightarrow \mathbb{R}$

$D_f = (-1, 0) \cup (0, 1)$

$E_f = \mathbb{R} \setminus (-1, 1) = (-\infty, -1] \cup [1, +\infty)$

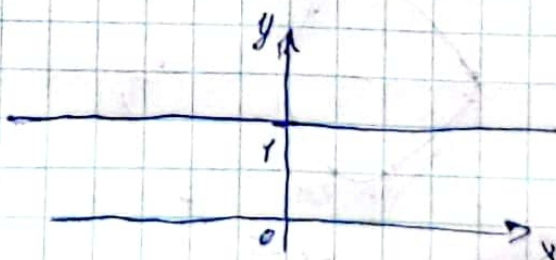
3)  $X = \mathbb{R}, Y = \mathbb{Z} \quad f: \mathbb{R} \rightarrow \mathbb{Z}$

$D_f = \mathbb{R} \setminus \mathbb{Z} \quad \frac{\arcsin \frac{1}{k}}{\pi}, \text{ где } k \in \mathbb{Z}, k \neq 0$

$E_f = \mathbb{Z} \setminus 0$

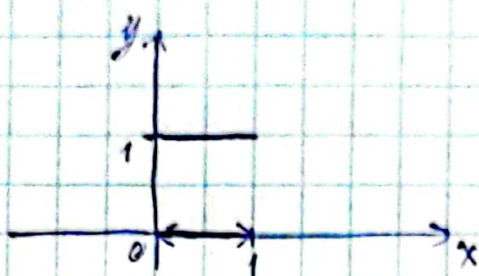
$$3.9 D(x) = \begin{cases} 1, & x \in \mathbb{Q} \\ 0, & x \in \mathbb{R} \setminus \mathbb{Q} \end{cases}$$

1)  $A = \mathbb{Q}$

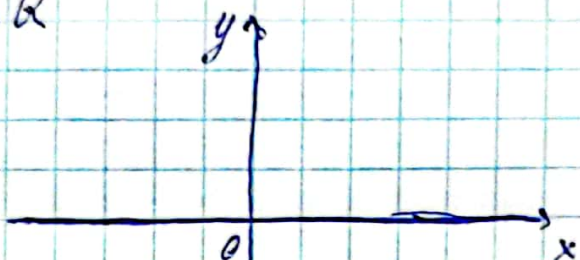




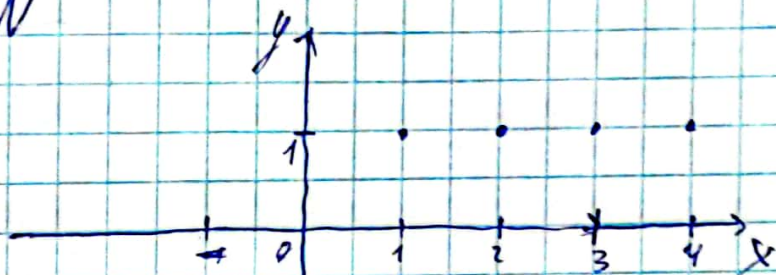
$$2) A = [0; 1]$$



$$3) A = \mathbb{R} \setminus \mathbb{Q}$$



$$4) A = \mathbb{N}$$



$$(M, \leq), \forall a, b \in M: a \leq b \Leftrightarrow a \leq b$$

$$3.10 M = [-1; 1]$$

$$1) X = [-\frac{1}{2}, \frac{1}{2}] \quad \inf X = X_{\min} = -\frac{1}{2} \quad \overline{X} = [-1; -\frac{1}{2}]$$

$$\sup X = X_{\max} = \frac{1}{2} \quad \underline{X} = [\frac{1}{2}; 1]$$

$$2) X = (0, 1) \quad X_{\max} = \overline{X} = 1 \quad \sup X = \overline{X} = 1$$

$$X_{\min} = \underline{X} = -1; 0] \quad \inf X = 0$$

$$3) X = (-\frac{1}{2}; \frac{1}{3}) \cup \{\frac{1}{2}\} \quad X_{\max} = \frac{1}{2} \quad \overline{X} = [\frac{1}{2}; 1] \quad \sup X = \frac{1}{2}$$

$$X_{\min} = \underline{X} = [-1; -\frac{1}{2}] \quad \inf X = -\frac{1}{2}$$

$$3.11 M = \mathbb{R}$$

$$1) X = \left\{ \frac{3n}{n^2+3} \mid n \in \mathbb{N} \right\} \quad X_{\max} = 0,25 \quad \overline{X} = (-\infty; 0,25] \quad \sup X = 0,25 \quad \inf X = 0$$

$$X_{\min} = \underline{X} = (-\infty; 0]$$

$$[0; 0,25]$$

$$\sup X = 0,25 \quad \inf X = 0$$

$$2) X = \left\{ \frac{n^5}{n^6+1} \mid n \in \mathbb{Z} \right\} \quad X_{\max} = 0,5 \quad \overline{X} = [0,5; +\infty)$$

$$[-0,5; 0) \cup (0; 0,5] \quad X_{\min} = -0,5 \quad \underline{X} = (-\infty; -0,5]$$

$$\sup X = 0,5$$

$$\inf X = -0,5$$