

INTERVALE MĂRGINITE

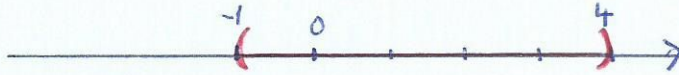
1. Dacă $a < x < b$ atunci $x \in (a; b)$.



INTERVAL DESCHIS $(a; b)$
 $a \notin (a; b)$; $b \notin (a; b)$.

Exp: $-1 < x < 4 \Rightarrow x \in (-1; 4)$

u. \rightarrow u = unitate = 1 cm;

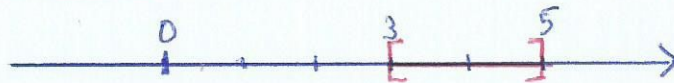


2. Dacă $a \leq x \leq b$ atunci $x \in [a; b]$.

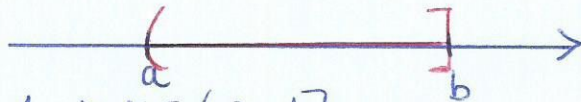


INTERVAL ÎNCHIS $[a; b]$
 $a \in [a; b]$; $b \in [a; b]$.

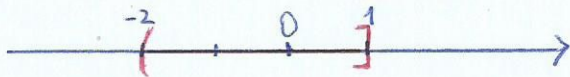
Exp: $3 \leq x \leq 5 \Rightarrow x \in [3; 5]$.



3. Dacă $a < x \leq b$ atunci $x \in (a; b]$.



Exp: $-2 < x \leq 1 \Rightarrow x \in (-2; 1]$.

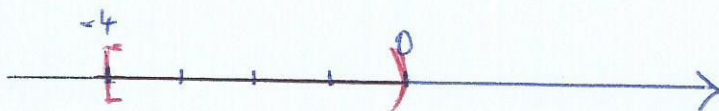


INTERVAL DESCHIS LA STÂNGA ÎN a și ÎNCHIS LA DREAPTA ÎN b .
 $a \notin (a; b]$; $b \in (a; b]$.

4. Dacă $a \leq x < b$ atunci $x \in [a; b)$.



Exp: $-4 \leq x < 0 \Rightarrow x \in [-4; 0)$.



INTERVAL ÎNCHIS LA STÂNGA ÎN a și DESCHIS LA DREAPTA ÎN b .
 $a \in [a; b)$; $b \notin [a; b)$.

EXERCITII REZOLVATE

E1 Realizati intervalele corespunzătoare următoarelor mulțimi:

$\mathbb{R} \rightarrow$ REZOLVARE!!!

$$A = \{x \in \mathbb{R} / \sqrt{2} < x \leq 11\} = (\sqrt{2}; 11]$$

$$B = \{x \in \mathbb{R} / -3 \leq x \leq 9\} = [-3; 9]$$

$$C = \{x \in \mathbb{R} / -\sqrt{3} \leq x < \sqrt{2}\} = [-\sqrt{3}; \sqrt{2})$$

$$D = \{x \in \mathbb{R} / -\sqrt{7} < x < \sqrt{7}\} = (-\sqrt{7}; \sqrt{7})$$

$$E = \{x \in \mathbb{R} / 0 < x \leq 1\} = (0; 1]$$

$$F = \{x \in \mathbb{R} / -\sqrt{5} \leq x < -\sqrt{2}\} = [-\sqrt{5}; -\sqrt{2})$$

$$G = \{x \in \mathbb{R} / 10 \leq x \leq 11\} = [10; 11]$$

Intervalele
există dacă
 $x \in \mathbb{R}$!!!

Obs:

$$H = \{x \in \mathbb{N} / -5 < x \leq 3\} = \{0; 1; 2; 3\}$$

↓
În acest caz răspunsul nu este un interval
deoarece $x \in \mathbb{N}$!!!

$$I = \{x \in \mathbb{Z} / -3 \leq x < 2\} = \{-3; -2; -1; 0; 1\}$$

În acest caz răspunsul nu este un interval
deoarece $x \in \mathbb{Z}$!

$$J = \{x \in \mathbb{R} / -5 < x \leq 3\} = (-5; 3]$$

$$K = \{x \in \mathbb{R} / -3 \leq x < 2\} = [-3; 2)$$

La J și K răspunsurile SUNT INTERVALE
deoarece $x \in \mathbb{R}$!!!

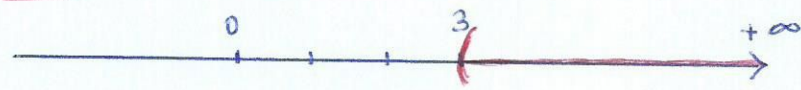
INTERVALE NEMĂRGINITE

1. Dacă $x > a$ atunci $x \in (a; +\infty)$



INTERVAL DESCHIS LA STÂNGA ȘI NEMĂRGINIT LA DREAPTA.

Exp: $x > 3 \Rightarrow x \in (3; +\infty)$



$a \notin (a; +\infty)$

2. Dacă $x \geq a$ atunci $x \in [a; +\infty)$



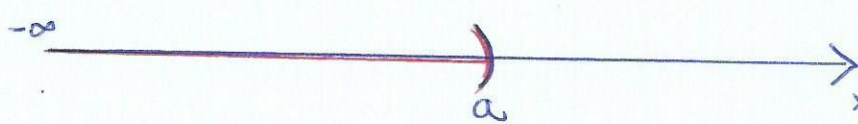
INTERVAL ÎNCHIS LA STÂNGA ȘI NEMĂRGINIT LA DREAPTA.

Exp: $x \geq 4 \Rightarrow x \in [4; +\infty)$



$a \in [a; +\infty)$

3. Dacă $x < a$ atunci $x \in (-\infty; a)$



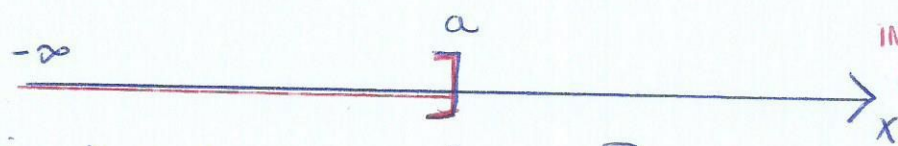
INTERVAL NEMĂRGINIT LA STÂNGA ȘI DESCHIS LA DREAPTA.

Exp: $x < -2 \Rightarrow x \in (-\infty; -2)$



$a \notin (-\infty; a)$

4. Dacă $x \leq a$ atunci $x \in (-\infty; a]$



INTERVAL NEMĂRGINIT LA STÂNGA ȘI ÎNCHIS LA DREAPTA.

Exp: $x \leq 3 \Rightarrow x \in (-\infty; 3]$



$a \in (-\infty; a]$

EXERCITII REZOLVATE

E2: Precizați intervalele corespunzătoare următoarelor mulțimi:

Rezolvare!!!

$$A = \{x \in \mathbb{R} / x < 0\} = (-\infty; 0).$$

$$B = \{x \in \mathbb{R} / x \geq \sqrt{3}\} = [\sqrt{3}; +\infty).$$

$$C = \{x \in \mathbb{R} / x > -\sqrt{2}\} = (-\sqrt{2}; +\infty).$$

$$D = \{x \in \mathbb{R} / x \leq 10\} = (-\infty; 10].$$

$$E = \{x \in \mathbb{R} / x \geq -\sqrt{7}\} = [-\sqrt{7}; +\infty);$$

$$F = \{x \in \mathbb{R} / x < -2\} = (-\infty; -2).$$

$$G = \{x \in \mathbb{R} / x \leq 2\sqrt{2}\} = (-\infty; 2\sqrt{2}].$$

$$H = \{x \in \mathbb{R} / -3 < x \leq \sqrt{11}\} = (-3; \sqrt{11}].$$

$$I = \{x \in \mathbb{R} / x \geq 0\} = [0; +\infty).$$

$$J = \{x \in \mathbb{R} / -4 \leq x \leq 4\} = [-4; 4].$$

$$K = \{x \in \mathbb{R} / x > -\sqrt{7}\} = (-\sqrt{7}; +\infty);$$

$$L = \{x \in \mathbb{R} / -2 \leq x \leq 3\sqrt{2}\} = [-2; 3\sqrt{2}].$$

$$M = \{x \in \mathbb{R} / x \leq 3\sqrt{3}\} = (-\infty; 3\sqrt{3}].$$

$$N = \{x \in \mathbb{R} / x \geq -\sqrt{5}\} = [-\sqrt{5}; +\infty).$$

E3. Scrieți sub formă de interval mulțimea:

$$A = \left\{x \in \mathbb{R} / -8 < \frac{4x+12}{2} \leq 13\right\}$$

$$\text{R: } -8 < \frac{4x+12}{2} \leq 13 / \cdot 2 \Leftrightarrow -16 < 4x+12 \leq 26 / -12 \Leftrightarrow$$

$$\Leftrightarrow -16-12 < 4x \leq 26-12 \Leftrightarrow -28 < 4x \leq 14 / :4 \Leftrightarrow$$

$$\Leftrightarrow -7 < x \leq \frac{14}{4} \Leftrightarrow \left. \begin{array}{l} -7 < x \leq \frac{7}{2} \\ x \in \mathbb{R} \end{array} \right\} \Rightarrow x \in (-7; \frac{7}{2}].$$

INTERVALE SIMETRICE

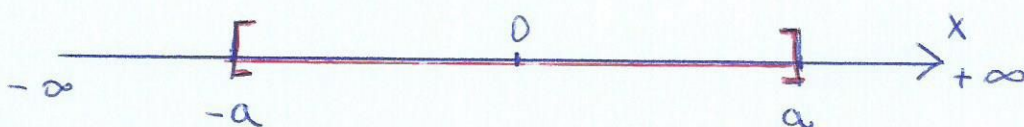
1. Dacă $|x| < a$ atunci $x \in (-a; a)$.



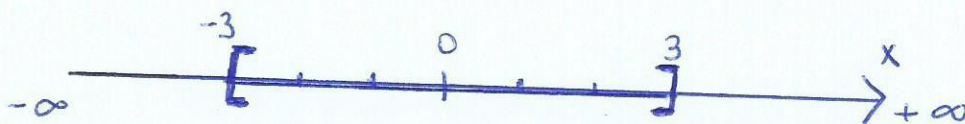
Exp: $|x| < 4 \Rightarrow x \in (-4; 4)$.



2. Dacă $|x| \leq a$ atunci $x \in [-a; a]$.



Exp: $|x| \leq 3 \Rightarrow x \in [-3; 3]$.



OBS:

1. $\mathbb{R} = (-\infty; +\infty)$.

2. $|x| > a \Leftrightarrow x \in (-\infty; -a) \cup (a; +\infty)$.

3. $|x| \geq a \Leftrightarrow x \in (-\infty; -a] \cup [a; +\infty)$.

Exp: $\frac{x \in \mathbb{R}}{|x| > 1} \Leftrightarrow x \in (-\infty; -1) \cup (1; +\infty)$;

! $|x| < 1 \Leftrightarrow x \in (-1; 1)$;

! $|x| \geq 1 \Leftrightarrow x \in (-\infty; -1] \cup [1; +\infty)$;

$|x| \leq 1 \Leftrightarrow x \in [-1; 1]$.

EXERCITII REZOLVATE

E4. Scrieți sub formă de interval mulțimile:

a) $A = \{x \in \mathbb{R} \mid |x| < 2\}$

b) $B = \{x \in \mathbb{R} \mid |x| \leq 4\}$

c) $C = \{x \in \mathbb{R} \mid |x-2| \leq 5\}$

d) $\Delta = \{x \in \mathbb{R} \mid |2x+3| < 8\}$

R.: Rezolvare:

a) $|x| < 2 \Leftrightarrow x \in (-2; 2) \Leftrightarrow A = (-2; 2).$

b) $|x| \leq 4 \Leftrightarrow x \in [-4; 4] \Leftrightarrow B = [-4; 4].$

c) $|x-2| \leq 5 \Leftrightarrow -5 \leq x-2 \leq 5 \quad / +2$
 $-5+2 \leq x \leq 5+2$
 $-3 \leq x \leq 7 \Leftrightarrow x \in [-3; 7]$
 $\Leftrightarrow C = [-3; 7].$

d) $|2x+3| < 8 \Leftrightarrow -8 < 2x+3 < 8 \quad / -3$
 $-8-3 < 2x < 8-3$
 $-11 < 2x < 5 \quad / : 2$
 $-\frac{11}{2} < x < \frac{5}{2} \Leftrightarrow x \in \left(-\frac{11}{2}; \frac{5}{2}\right)$
 $\Delta = \left(-\frac{11}{2}; \frac{5}{2}\right).$

E5. Determinați elementele mulțimilor:

a) $A = \{x \in \mathbb{N} \mid |x| < 3\}$

b) $B = \{x \in \mathbb{R} \mid |x| \leq 3\}$

c) $C = \{x \in \mathbb{Z} \mid \left|\frac{x-7}{2}\right| \leq 1\}$

d) $\Delta = \{x \in \mathbb{R} \mid \left|\frac{x-7}{2}\right| \leq 1\}$

R.: a) $|x| < 3 \Leftrightarrow -3 < x < 3 \quad / \Rightarrow$
 $x \in \mathbb{N} \Rightarrow x \in \{0, 1, 2\}. \quad A = \{0, 1, 2\}.$

b) $|x| \leq 3 \Leftrightarrow x \in (-3; 3)$
 $x \in \mathbb{R} \quad B = (-3; 3).$

c) $\left|\frac{x-7}{2}\right| \leq 1 \Leftrightarrow -1 \leq \frac{x-7}{2} \leq 1 \quad / \cdot 2$

$\Leftrightarrow -2 \leq x-7 \leq 2 \quad / +7 \Leftrightarrow 5 \leq x \leq 9 \Leftrightarrow x \in \{5; 6; 7; 8; 9\}.$
 $x \in \mathbb{Z} \quad C = \{5; 6; 7; 8; 9\}.$

d) la fel ca la c) până la $5 \leq x \leq 9 \quad / \Rightarrow x \in [5; 9].$
 $x \in \mathbb{R} \quad \Delta = [5; 9].$

FISĂ DE LUCRU

E₁. Precizați intervalele corespunzătoare următoarelor mulțimi:

- a) $A = \{x \in \mathbb{R} / -3 < x \leq 5\}$; b) $B = \{x \in \mathbb{R} / x \geq 7\}$; c) $C = \{x \in \mathbb{R} / x < -3\}$
d) $\Delta = \{x \in \mathbb{R} / 0 < x < \sqrt{\pi}\}$; e) $E = \{x \in \mathbb{R} / x < -3\}$; f) $F = \{x \in \mathbb{R} / x > \sqrt{7}\}$
g) $G = \{x \in \mathbb{R} / x \leq -\sqrt{5}\}$; h) $H = \{x \in \mathbb{R} / -3 \leq x \leq \sqrt{\pi}\}$.

E₂ Scrieți sub formă de interval mulțimile:

- a) $A = \{x \in \mathbb{R} / |x| < 1\}$; b) $B = \{x \in \mathbb{R} / |x| \leq 7\}$
c) $C = \{x \in \mathbb{R} / |x-3| < 2\}$; d) $\Delta = \{x \in \mathbb{R} / |\frac{x-1}{4}| \leq 5\}$
e) $E = \{x \in \mathbb{R} / |\frac{2x-4}{3}| < 11\}$.

E₃ Determinați elementele mulțimilor:

- a) $A = \{x \in \mathbb{N} / -4 < x \leq 3\}$
b) $B = \{x \in \mathbb{Z} / -4 < x \leq 3\}$
c) $C = \{x \in \mathbb{R} / -4 < x \leq 3\}$
d) $\Delta = \{x \in \mathbb{R} / |2x-1| < 4\}$
e) $E = \{x \in \mathbb{N} / |x| \leq 5\}$
f) $F = \{x \in \mathbb{Z} / |3x-8| \leq 10\}$
g) $G = \{x \in \mathbb{R} / |x| \geq 10\}$
h) $H = \{x \in \mathbb{N} / -1 \leq \frac{3x+8}{2} \leq 8\}$
i) $I = \{x \in \mathbb{Z} / -3 \leq \frac{4x-5}{3} < 5\}$
j) $J = \{x \in \mathbb{R} / -10 \leq \frac{4x-1}{3} \leq 10\}$.

E₄ Determinați card A în cazurile:

- $A = \{x \in \mathbb{N} / 1 < x < 8\}$; $B = \{x \in \mathbb{N}^* / |x+1| \leq 4\}$;
 $C = \{x \in \mathbb{Z} / |2x-1| \leq 7\}$; $\Delta = \{x \in \mathbb{Z}^* / |\frac{x-9}{2}| < 2\}$.