Intervale

Scrieți sub formă de interval, sau reuniuni de intervale:

1) $A = \{ x \in \mathbb{R} \mid x < -2 \text{ sau } x \geq 2 \}$

SAU = $\cup$ (reuniune) ș.i = $\cap$ (intersecție)

$A = (-\infty, -2) \cup [2, +\infty)$

2) $B = \{ x \in \mathbb{R} \mid x < -1 \text{ și } x > 1 \}$

$B = (-\infty, -1) \cap (1, +\infty) = \emptyset$

3) $C = \{ x \in \mathbb{R} \mid x < 3 \text{ sau } x \geq 4 \}$ $D = \{ x \in \mathbb{R} \mid x < 3 \text{ ș.i } x \geq 4 \}$

$C = (-\infty, 3) \cup [4, +\infty)$ $D = (-\infty, 3) \cap [4, +\infty) = \emptyset$

4) $E = \{ x \in \mathbb{R} \mid x < 4 \text{ sau } x > 0 \}$

$F = \{ x \in \mathbb{R} \mid x < 4 \text{ și } x > 0 \}$

$E = (-\infty, 4) \cup (0, +\infty] = (-\infty, +\infty) = \mathbb{R}$

$F = (-\infty, 4) \cap (0, +\infty) = (0; 4)$

5) $M = \{ x \in \mathbb{R} \mid x < -3 \text{ sau } x < -2 \}$

$P = \{ x \in \mathbb{R} \mid x < -3 \text{ și } x < -2 \}$

$M = (-\infty, -3) \cup (-\infty, -2) = (-\infty, -2)$

$P = (-\infty, -3) \cap (-\infty, -2) = (-\infty, -3)$

OBS: Dacă $x \in \mathbb{R}$, $a \in \mathbb{R}_+$ (adică $a > 0$)

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

2) $|x| \leq a \Leftrightarrow -a \leq x \leq a \Leftrightarrow x \in [-a; a]$

3) $|x| > a \Leftrightarrow x < -a$ sau $x > a \Leftrightarrow$
$x \in (-\infty, -a) \cup (a, +\infty)$

4) $|x| \geq a \Leftrightarrow x \leq -a$ sau $x \geq a \Leftrightarrow$
$x \in (-\infty, -a] \cup [a, +\infty)$

Exc:

$|x| < 3 \Leftrightarrow -3 < x < 3 \Leftrightarrow x \in (-3; 3)$

$|x| \leq 3 \Leftrightarrow -3 \leq x \leq 3 \Leftrightarrow x \in [-3; 3]$

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

$|x| < 0$ $\begin{cases} (\forall) x \in \mathbb{R} \Rightarrow |x| \geq 0 \\ |x| < 0 \end{cases}$ imposibil $\Rightarrow x \in \emptyset$

$|x| \leq 0$ $\begin{cases} (\forall) x \in \mathbb{R} \Rightarrow |x| \geq 0 \\ |x| \leq 0 \end{cases} \Rightarrow x = 0$

$|x| < -3$ $\begin{cases} (\forall) x \in \mathbb{R} \Rightarrow |x| \geq 0 \\ |x| < -3, \ -3 < 0 \Rightarrow |x| < 0 \end{cases} \Rightarrow x \in \emptyset$

$A = \{x \in \mathbb{R} \mid |2x+3| < 5\}$

$|2x+3| < 5 \Leftrightarrow -5 < 2x+3 < 5 \ | -3 \Leftrightarrow$

$-5-3 < 2x+3-3 < 5-3 \Leftrightarrow -8 < 2x < 2 \ | \cdot \frac{1}{2}$

$-4 < x < 1 \Leftrightarrow x \in (-4;1) \Rightarrow A = (-4;1)$

$B = \{x \in \mathbb{R} \mid |3x-1| \leq 5\}$

$|3x-1| \leq 5 \Leftrightarrow -5 \leq 3x-1 \leq 5 \mid +1 \Leftrightarrow$

$-4 \leq 3x \leq 6 \mid \cdot \frac{1}{3} \Leftrightarrow -\frac{4}{3} \leq x \leq 2 \Rightarrow B = \left[-\frac{4}{3};2\right]$

$C = \{x \in \mathbb{R} \mid |-5x+4| < 1\}$

$-10 < 1 \mid \cdot(-1) \Rightarrow 10 > -1$

$-3 < -2 \mid \cdot(-1) \Rightarrow 3 > 2$

$|-5x+4| < 1 \Leftrightarrow -1 < -5x+4 < 1 \mid -4 \Leftrightarrow$

$-5 < -5x < -3 \mid \cdot\left(-\frac{1}{5}\right) \Leftrightarrow + \; 1 > x > \frac{3}{5} \Leftrightarrow$

$\frac{3}{5} < x < 1 \Leftrightarrow x \in \left(\frac{3}{5};1\right)$

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