

Name .....

		row ...	col....	
1.	2.	3.	4.	$\Sigma$

1. For  $X_{a,b} = \{(x, y) \in \mathbb{R}^2 : y > a(x - b)^2\}$  where  $a, b \in \mathbb{R}$ . Find:

$\bigcap_{b \in \mathbb{R}} X_{a,b}$

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$\bigcup_{b \in \mathbb{R}} X_{a,b}$

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$\bigcup_{a \in \mathbb{R}} X_{a,b}$

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$\bigcap_{b \in \mathbb{R}} \bigcup_{a \in \mathbb{R}} X_{a,b}$

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2. For  $x, y \in \mathbb{R}$  let  $x \sim y \Leftrightarrow \sin x = \sin y$ . Prove that  $\sim$  is equivalence relation, find equivalence class  $[0]_{\sim}$ .

3. Let  $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ ,  $f(x, y) = \frac{1}{xy}$ . Find  $f(\{(x, x) : x \in \mathbb{R}\})$  and  $f^{-1}(\{1\})$ .

4. For  $(a, b), (c, d) \in \mathbb{N}^2$  let  $(a, b) \preceq (c, d) \Leftrightarrow (a, b) = (c, d) \vee \max(a, b) < \max(c, d)$ . Prove, that  $\preceq$  is partial order. Do not draw Hasse diagram.

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1. For  $X_{a,b} = \{(x, y) \in \mathbb{R}^2 : y < a(x - b)^2\}$  where  $a, b \in \mathbb{R}$ . Find:

$$\bigcap_{b \in \mathbb{R}} X_{a,b}$$


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$$\bigcup_{b \in \mathbb{R}} X_{a,b}$$


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$$\bigcup_{a \in \mathbb{R}} X_{a,b}$$


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$$\bigcap_{b \in \mathbb{R}} \bigcup_{a \in \mathbb{R}} X_{a,b}$$


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2. For  $x, y \in \mathbb{R}$  let  $x \sim y \Leftrightarrow \cos x = \cos y$ . Prove that  $\sim$  is equivalence relation, find equivalence class  $[0]_{\sim}$ .

3. Let  $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ ,  $f(x, y) = \frac{1}{xy}$ . Find  $f(\{(x, x) : x \in \mathbb{R}\})$  and  $f^{-1}(\{-1\})$ .

4. For  $(a, b), (c, d) \in \mathbb{N}^2$  let  $(a, b) \preceq (c, d) \Leftrightarrow (a, b) = (c, d) \vee a + b < c + d$ . Prove, that  $\preceq$  is partial order. Do not draw Hasse diagram.