

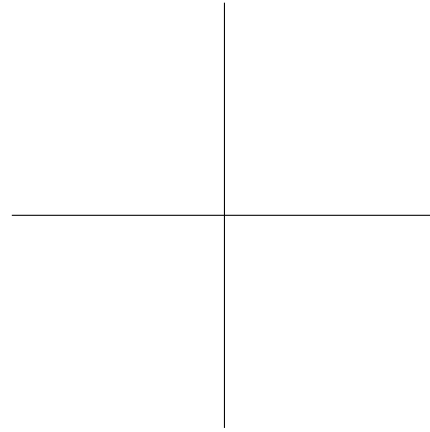
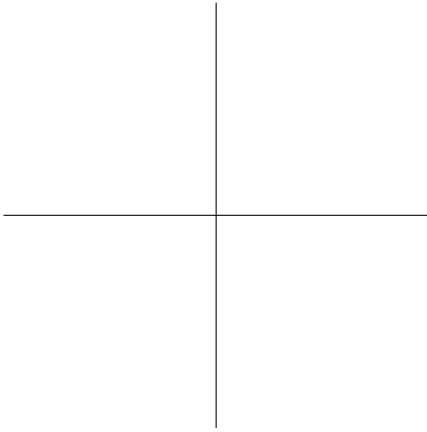
Name

HA	row	col....
1.	2.	3.
		Σ

1.(3p) For $X_{a,b} = \{(x, y) \in \mathbb{R}^2 : y \geq a(x - b)^2 + \frac{1}{b}\}$ where $a, b \in \mathbb{R}$. Find:

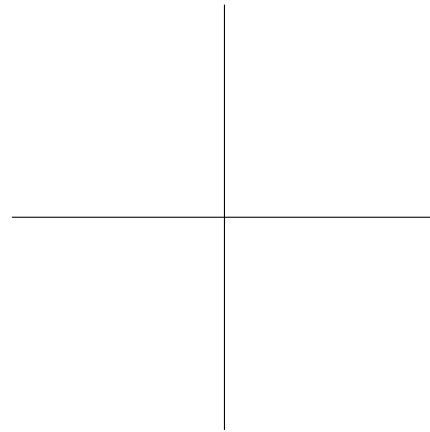
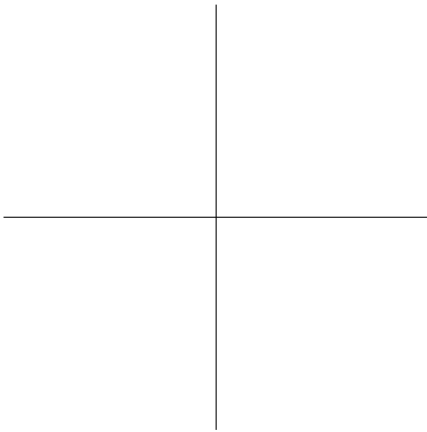
$$\bigcap_{a>0} X_{a,b}$$

$$\bigcup_{b \in \mathbb{R}} \bigcap_{a>0} X_{a,b}$$

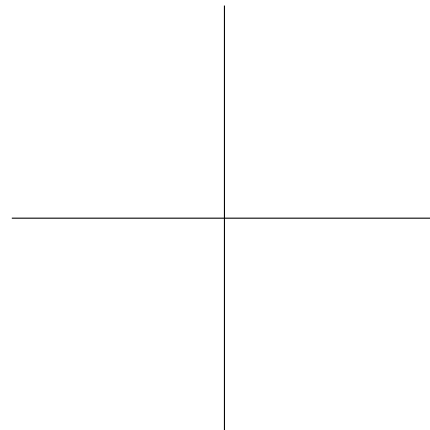


$$\bigcup_{a>0} X_{a,b}$$

$$\bigcup_{b \in \mathbb{R}} \bigcup_{a>0} X_{a,b}$$



2.(2p) Find $f[A]$ and scratch $f^{-1}[f[A]]$ for $A = [1, 2] \times [0, 1)$ and $f(x, y) = \frac{1}{x^2 - y}$



3.(3p) Are given relations functions? For functions find their domain, set of values and settle if they are one-to-one functions ? $x, y, z \in \mathbb{R}$.

$$(x, y)Rz \Leftrightarrow 4z^4 + x^4y^4 = 4x^2y^2z^2$$

$$(x, y)Sz \Leftrightarrow (x^2 - y)^2 + z^2 = 0$$

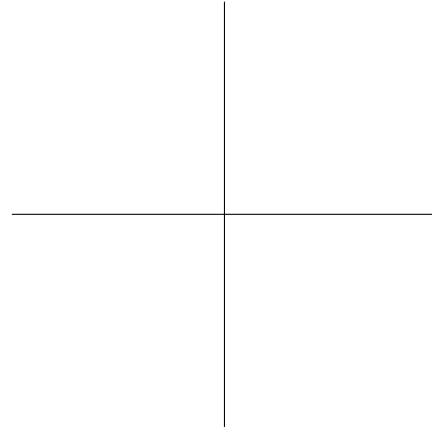
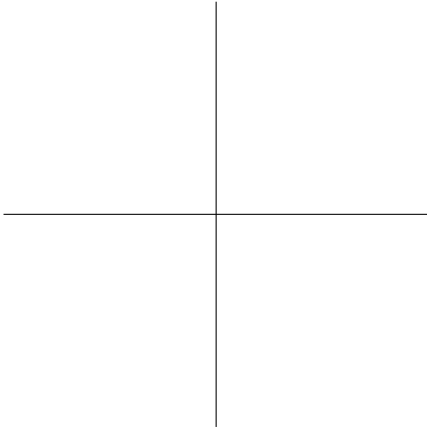
Name

HA	row	col....	
1.	2.	3.	Σ

1.(3p) For $X_{a,b} = \{(x,y) \in \mathbb{R}^2 : y > a(x-b)^2 + b^2\}$ where $a, b \in \mathbb{R}$. Find:

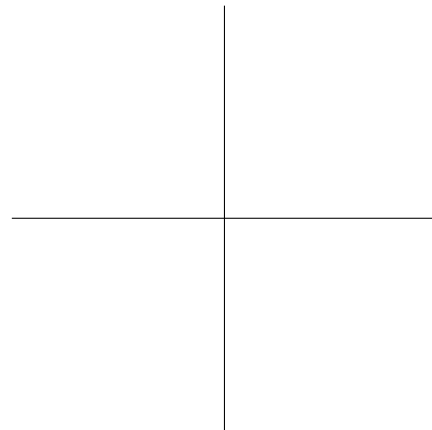
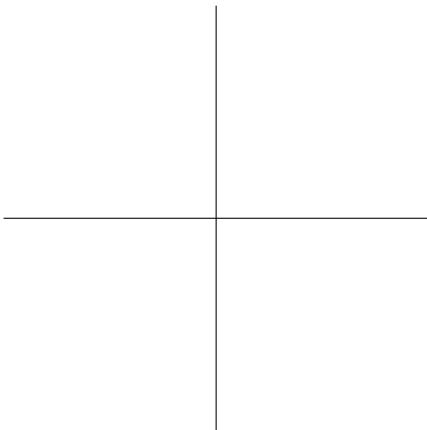
$$\bigcap_{a>0} X_{a,b}$$

$$\bigcup_{b \in \mathbb{R}} \bigcap_{a>0} X_{a,b}$$

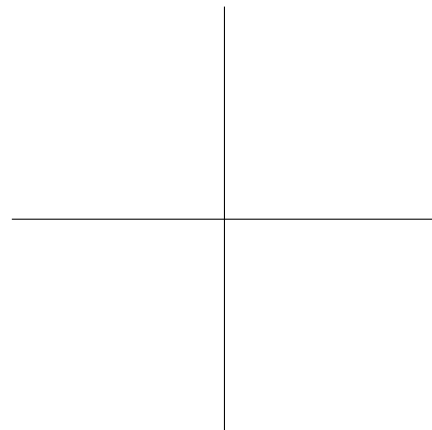


$$\bigcup_{a>0} X_{a,b}$$

$$\bigcup_{b>0} \bigcup_{a>0} X_{a,b}$$



2.(2p) Find $f[A]$ and scratch $f^{-1}[f[A]]$ for $A = [1, 2] \times [0, 1)$ and $f(x, y) = \frac{1}{(x+y)^2}$



3.(3p) Are given relations functions? For functions find their domain, set of values and settle if they are one-to-one functions ? $x, y, z \in \mathbb{R}$.

$$(x, y)Rz \Leftrightarrow (x + y^2)^2 = -z^2$$

$$(x, y)Sz \Leftrightarrow z^4 + 4x^4y^4 = 4x^2y^2z^2$$