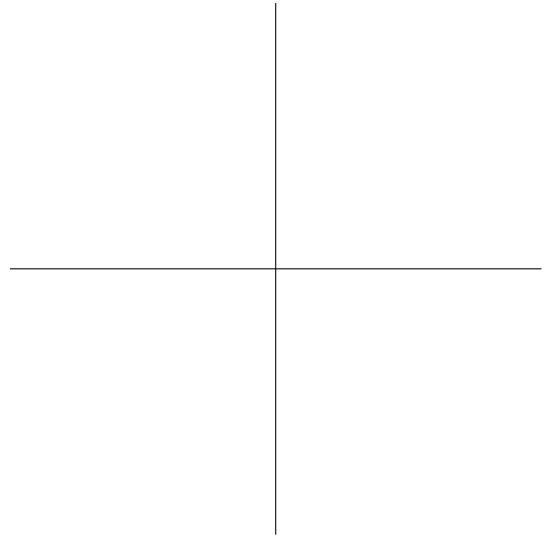


Name

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1. For $(x, y), (s, t) \in \mathbb{R}^2$ let $(x, y) \sim (s, t) \Leftrightarrow x \cdot y = s \cdot t$. Prove that \sim is equivalence relation, find equivalence class $[(0, 0)]_{\sim}, [(1, 0)]_{\sim}, [(1, 1)]_{\sim}$.

2. Let $f : \mathbb{R}^2 \rightarrow \mathbb{R}$, $f(x, y) = (x - y)(x + y)$. Find $f(A)$ and $f^{-1}(f(A))$ for $A = \{(x, x) : x \in \mathbb{R}\}$. Is f one-to-one ?



3. Let $x, y \in \mathbb{R}$. Are relations R, S functions ? If so find its domain. Explain your answer.

$$xRy \Leftrightarrow \exists a \ a \cdot x = y$$

$$xSy \Leftrightarrow \forall a \ a \cdot x = y$$