Homework

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Relation	Transitivity	Reflexivity	Symmetry
$x < y$	+	—	asymmetric
$x \leq y$	+	+	antisymmetric
A divides B	+	+	asymmetric.
A fixes a car of B	—	—	asymmetric.

function	surjective	Injective	Bijective	Pre-image	Image
$x^2: R \to R$	—	—	—	$(-\infty; +\infty)$	$[0; +\infty)$
$\log(x): R \to R$	+	+	—	$(0; +\infty)$	$(-\infty; +\infty)$
$1/x: R \to R$	—	+	—	$(-\infty; 0) \cup (0; +\infty)$	$(-\infty; 0) \cup (0; +\infty)$
$1/(x^2+1): R \to R$	—	—	—	$(-\infty; +\infty)$	$(0; 1]$

Why is f not a function from $\mathbb{R}$ to $\mathbb{R}$ if

1. $f(x) = 1/x$ ~~...~~ $x = 0 \in \mathbb{R}$ but there is no image for $x = 0$. Therefore $f(x) = 1/x$ is not a $\mathbb{R}$ to $\mathbb{R}$ function.

2. $f(x) = \sqrt{x}$ $x < 0 \in \mathbb{R}$ but there is no image for $x < 0$. therefore $f(x) = \sqrt{x}$ is not a $\mathbb{R}$ to $\mathbb{R}$ function

3. $f(x) = \pm\sqrt{x^2+1}$ Because for $\forall x$ we have 2 images. And it is not possible. Therefore $f(x) = \pm\sqrt{x^2+1}$ is not a $\mathbb{R}$ to $\mathbb{R}$ function.

$f: \mathbb{Z} \times \mathbb{Z} \to \mathbb{Z}$ is onto?

4. $f(m,n) = m+n$ yes
5. $f(m,n) = m^2+n^2$ no
6. $f(m,n) = m$ yes
7. $f(m,n) = |n|$ no
8. $f(m,n) = m-n$ yes