(2) $R \to R$.
$R \Rightarrow \{(a,b) : a \le b^2\}$.

∴ Reflexive If the value of a and b is 2.

then, $2 \le 2^2$

$2 \le 4$

yes it is Related.

But if we put here fractional no. which is Real no.

$\left(\frac{1}{3}, \frac{1}{2}\right) \Rightarrow \frac{1}{3} \le \left(\frac{1}{2}\right)^2$

$\Rightarrow \frac{1}{3} \le \frac{1}{4}$

Here $\frac{1}{3}$ is greater than $\frac{1}{4}$ but in the expression it is not the same.

So, it is not reflexive.

∴ Symmetric $\Rightarrow (x,y) \in R$ then $(y,x) \in R$
$(1,2) \in R$, $(2,1) \notin R$
$1 \le 2^2$ ✓ $\quad 2 \le 1^2$ ✗

So, it is not symmetric.

∴ Transitive :- $(x,y) \in R$, $(y,z) \in R \Rightarrow (x,z) \in R$.
Here, $(1,2) \in R$, $(2,9) \in R$ but $(1,3) \notin R$
$1 \le 2^2$ ✓ $\quad 2 \le 9^2$ ✗ but $1 \le 3^2$

So, it is not Transitive

(3) $R = \{1,2,3,4,5,6\}$.
$R = \{(a,b) : b = a+1\}$.

∵ ~~Reflexive~~, $b = a+1$
$(1,2), (2,3) (3,4) (4,5) (5,6)$

∴ Reflexive $\Rightarrow (x,y) \in R \Rightarrow (x,x) \in R$.
Here $(1,2) \in R \Rightarrow$ But $(1,1) \notin R$
It is not Reflexive.

∴ Symmetric $\Rightarrow (x,y) \in R \Rightarrow (y,x) \in R$.
Here, $(2,3) \in R$ but $(3,2) \notin R$
It is not Symmetric

∴ Transitive $\Rightarrow (x,y) \in R, (y,z) \in R$ then $(x,z) \in R$
Here,
$(1,2) \in R, (2,3) \in R$ but $(1,3) \notin R$
It is not Transitive.

(4) $R \rightarrow R$.
$R = \{(a,b) : a \leq b\}$.
Reflexive
∴ $a = 1, b = 2$ (say)
$\Rightarrow (x,y) \in R \Rightarrow (x,x) \in R$.

$1 \leq 2^2$ ∴ $(1,2) \in R$ then
$(1,1) \in R$
yes it is Reflexive.

$\therefore$ Symmetric $\Rightarrow (x,y) \in R \Rightarrow (y,x) \in R$.

$(1,2) \in R$ but $(2,1) \notin R$.

It is not symmetric

$\therefore$ Transitive $\Rightarrow (x,y) \in R, (y,z) \in R$ then $(x,z) \in R$.

Here,

$(1,2) \in R$

$1 \le 2^2$ yes.

$(2,3) \in R$

$2 \le 3^2$ yes.

$(1,3) \in R$

$1 \le 3^2$ yes.

It is transitive.

Proved!!

(5) $R \rightarrow R = \{(a,b) : a \le b^3\}$.

$a = 1, \quad b = 2$ (say)

$1 \le 2^3$

$1 \le 8$

$\therefore$ Reflexive,:- $(x,y) \in R \Rightarrow (x,x) \in R$.

$(x,y) \Rightarrow (1,2) \in R$

$(x,x) \Rightarrow (1,1) \notin R$.

It is not Reflexive.

$\therefore$ Symmetric :- $(x,y) \in R \Rightarrow (y,x) \in R$
Here, $(1,2) \in R$ But $(2,1) \notin R$
$1 \leq 2^3$ ✓ $\quad 2 \leq 1^3$ ✗

No. It is not symmetric

$\therefore$ Transitive :- $(x,y) \in R$, $(y,z) \in R \Rightarrow (x,z) \in R$
Here, $a = 1$, $b = 2$, $c = 0$.

$(1,2) \in R \qquad (2,3) \in R$ then
$1 \leq 2^3$ ✓ $\qquad 2 \leq 0^3$ ✓

$(1,3) \in R$
$1 \leq \cancel{0}^3$ ~~yes~~ No

No, It is not Transitive.

(6) $R = \{1,2,3\}$
$R = \{(1,2),(2,1)\}$.
$\therefore$ Reflexive :- $(x,y) \in R \Rightarrow (x,x) \in R$
Here, $(1,2) \in R$ but $(1,1) \notin R$
It is not Reflexive

$\therefore$ Symmetric :- $(x,y) \in R \Rightarrow (y,x) \in R$
Here, $(1,2) \in R$ then $(2,1) \in R$
yes it is symmetric