Relations Ex 1.1 Q5.

(i) aRb if $a-b > 0$

Let R be the set of real numbers.

Reflexivity: Let $a \in R$

$\Rightarrow \quad a-a=0$

$\Rightarrow \quad (a,a) \notin R$

$\therefore \quad R$ is not reflexive

Symmetric: Let aRb

$\Rightarrow \quad a-a>0$

$\Rightarrow \quad b-a<0$

$\therefore \quad b \not R a$

$\therefore \quad R$ is not Symmetric

Transitive: Let aRb and bRc

$\Rightarrow \quad a-a>$ and $b-c>0$

$\Rightarrow \quad a-c>0$

$\Rightarrow \quad aRc$

$\therefore \quad R$ is Transitive

Relations Ex 1.1 Q5(ii)

We have, $a R b$ iff $1+ab>0$
Let R be the set of real numbers

Reflexive: Let $a \in R$

$\Rightarrow \quad 1+a^2>0$
$\Rightarrow \quad a R a$

$\Rightarrow \quad R$ is reflexive

Symmetric: Let aRb

$\Rightarrow \quad 1+ab>0$
$\Rightarrow \quad 1+ba>0$
$\Rightarrow \quad bRa$

$\Rightarrow \quad R$ is symmetric

Transitive: Let aRb and bRc

$\Rightarrow \quad 1+ab>0$ and $1+bc>0$
$\not\Rightarrow \quad 1+ac>0$

$\Rightarrow \quad R$ is not transitive

Relations Ex 1.1 Q5(iii)

We have, aRb if $|a| \le b$

Reflexivity: Let $a \in R$

$$\Rightarrow \quad |a| \nleq a \qquad \left[\because \quad |-2| = 2 > -2\right]$$

$$\Rightarrow \quad R \text{ is not reflexive}$$

Symmetric: Let aRb

$$\Rightarrow \quad |a| \le b$$

$$\nRightarrow \quad |b| \le a \qquad \left[\begin{array}{ll}\because & \text{Let } a = 4,\ b = 6 \\ & |4| \le 8 \text{ but } |8| > 4\end{array}\right]$$

$$\Rightarrow \quad R \text{ is not symmetric}$$

Transitive: Let aRb and bRc

$$\Rightarrow \quad |a| \le b \text{ and } |b| \le c$$

$$\Rightarrow \quad |a| \le |b| \le c$$

$$\Rightarrow \quad |a| \le c$$

$$\Rightarrow \quad a\,R\,c$$

$$\Rightarrow \quad R \text{ is transitive}$$

Relations Ex 1.1 Q6.

Let $A = \{1, 2, 3, 4, 5, 6\}$.

A relation R is defined on set A as:

$R = \{(a, b): b = a + 1\}$

Therefore, $R = \{(1, 2), (2, 3), (3, 4), (4, 5), (5, 6)\}$

We find $(a, a) \notin R$, where $a \in A$.

For instance, $(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6) \notin R$

Therefore, R is not reflexive.

It can be observed that $(1, 2) \in R$, but $(2, 1) \notin R$.

Therefore, R is not symmetric.

Now, $(1, 2), (2, 3) \in \mathbf{R}$

But, $(1, 3) \notin R$

Therefore, R is not transitive

Hence, R is neither reflexive, nor symmetric, nor transitive.

*********** END **********