



Relations Ex 1.1 Q1(i)

A be the set of human beings.

$$R = \{(x, y) : x \text{ and } y \text{ work at the same place}\}$$

Reflexive:

\therefore x and x works together

$$\therefore (x, x) \in R$$

$\Rightarrow R$ is reflexive

Symmetric: If x and y work at the same place, which implies,
 y and x work at the same place

$$\therefore (y, x) \in R$$

$\Rightarrow R$ is symmetric

Transitive: If x and y work at the same place
then x and y work at the same place and y and z work at the same place

$$\Rightarrow (x, z) \in R \text{ and}$$

Hence,

$\Rightarrow R$ is transitive

Relations Ex 1.1 Q1(ii)

.A be the set of human beings.

$$R = \{(x, y) : x \text{ and } y \text{ lives in the same locality} \}$$

Reflexive: since x and x lives in the same locality

$$\Rightarrow (x, x) \in R$$

$$\Rightarrow R \text{ is reflexive}$$

Symmetric: Let $(x, y) \in R$

$$\Rightarrow x \text{ and } y \text{ lives in the same locality}$$

$$\Rightarrow y \text{ and } x \text{ lives in the same locality}$$

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

Transitive: Let $(x, y) \in R$ and $(y, z) \in R$

$$(x, y) \in R$$

$$\Rightarrow x \text{ and } y \text{ lives in the same locality}$$

$$\text{and } (y, z) \in R$$

$$\Rightarrow y \text{ and } z \text{ lives in the same locality}$$

$$\Rightarrow x \text{ and } z \text{ lives in the same locality}$$

$$\Rightarrow (x, z) \in R$$

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

Relations Ex 1.1 Q1(iii)

$$R = \{(x, y) : x \text{ is wife of } y\}$$

Reflexive: since x can not be wife of x

$$\therefore (x, x) \notin R$$

$\Rightarrow R$ is not reflexive

Symmetric: Let $(x, y) \in R$

$\Rightarrow x$ is wife of y

$\Rightarrow y$ is husband of x

$$\Rightarrow (y, x) \notin R$$

$\Rightarrow R$ is not symmetric

Transitive: Let $(x, y) \in R$ and $(y, z) \in R$

$\Rightarrow x$ is wife of y and y is husband of z
which is a contradiction

$$\Rightarrow (x, z) \notin R$$

$\Rightarrow R$ is not transitive

Relations Ex 1.1 Q1(iv)

A be the set of human beings

$R = \{(x, y) : x \text{ is father of } y\}$

Reflexive: since x can not be father of x

$\therefore (x, x) \notin R$

$\Rightarrow R$ is not reflexive

Symmetric: Let $(x, y) \in R$

$\Rightarrow x$ is father of y

$\Rightarrow y$ can not be father of x

$\Rightarrow (y, x) \notin R$

$\Rightarrow R$ is not symmetric

Transitive: Let $(x, y) \in R$ and $(y, z) \in R$

$\Rightarrow x$ is father of y and y is father of z

$\Rightarrow x$ is grandfather of z

$\Rightarrow (x, z) \notin R$

$\Rightarrow R$ is not transitive

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