Class 11 Solutions Chapter 2 Relations Ex 2.3 Q20

We have,

$$R = \{(a,b) : a, b \in Z, a - b \text{ is an integer}\}$$

Clearly, $\text{Domain}(R) = z,$

$$\text{Range}(R) = z.$$

Class 11 Solutions Chapter 2 Relations Ex 2.3 Q21

Let $\left(1, \dfrac{-1}{2}\right) \in R_1$ and $\left(\dfrac{-1}{2}, -4\right) \in R_1$

$\Rightarrow$   $1 + 1 \times \dfrac{-1}{2} > 0$ and $1 + \left(\dfrac{-1}{2}\right) - 4 > 0$

But,   $1 + 1 \times (-4) = 1 - 4$

$$= -3 < 0$$

So,   $(1, -4) \notin R_1$

Class 11 Solutions Chapter 2 Relations Ex 2.3 Q22

We have,

$$(a,b)R(c,d) \Leftrightarrow a + d = b + c \text{ for all } (a,b), (c,d) \in N \times N$$

(i) We have,

$a + b = b + a$ for all $a, b \in N$

$\therefore$   $(a,b)R(a,b)$ for all, $a, b \in N$

(ii) Now,

$(a,b)R(c,d)$

$\Rightarrow$   $a + d = b + c$

$\Rightarrow$   $c + b = d + a$

$\Rightarrow$   $(c,d)R(a,b)$

(iii) Now,

$(a,b)R(c,d)$ and $(c,d)R(e,f)$

$\Rightarrow$   $a + d = b + c$ and $c + f = d + e$

$\Rightarrow$   $a + d + c + f = b + c + d + e$          [Adding]

$\Rightarrow$   $a + f = b + e$

$\Rightarrow$   $(a,b)R(e,f)$

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