Relation & function

Ques: $R = \{(x,y) : x-y \text{ is an integer.}\}$, R → define in set Z

i) Ref. → $\because (x,y)$; $x-y \to$ integer.

↳ $\because (x,x)$; $x-x = 0 \to$ integer. ✓

ii) Symm → (x,y); $x-y \to$ integ.

↳ (y,x); $y-x \to$ integ.

iii) Tran → $(x-y) \to$ integ. & $(y-z) \to$ integ.

$(x-z) = x-y+y-z \Rightarrow (x-z) \to$ integ.

iii) Tran. → $(a,b) \in R$ & $(b,c) \in R$

↓

$(a,c) \in R$

Let:- $(a \le b^2)$ & $(b \le c^2)$

$(a \le c^2)$

→ $a=3$, $b=2$, $c=1.5$

so: $3 \le (2)^2$ & $2 \le (1.5)^2$

$[3 \le (1.5)^2] \notin R$

Not Tran.

Ques. $R = \{(a,b) : a \le b^2\}$, R → in real no

i) Ref. → $\forall a = 2 \Rightarrow (a,a) = a \le a^2 \Rightarrow a \le 2^2$ ✓

$a = \frac{1}{2} \Rightarrow (a,a) = a \le a^2 \Rightarrow \frac{1}{2} \le \frac{1}{4}$ → not ref. ✗

ii) Symm → $\because (a,b)$; $a \le b^2 \in R \Rightarrow b \le a^2 \notin R$ Let $a=1, b=2 \Rightarrow (1,2) \in R$, $(2,1) \notin R$

Relation & function

Ex: if $R = \{(x, y); x \text{ is a factor of } y\}$ is Transitive.

Sol^n:- $\because (a, b) \in R$ & $(b, c) \in R \Rightarrow (a, b) \in R$

$\therefore (a, b)$; a is a factor of b. $\Rightarrow b = a \cdot k_1$ — (1)

& (b, c); b is a factor of c. $\Rightarrow c = b \cdot k_2$ — (2)

Now:- from eq^n (1) & (2):- $c = a k_1 k_2 \Rightarrow c = ak$

$\Rightarrow a$ is a factor of $c \Rightarrow (a, c) \in R$

11.3

L_1, L_2 or $R \Rightarrow (L_1 \perp L_2) \in R$

$= \{1, 2, 3\} \rightarrow R = \{(1, 2), (2, 1)\}$

Ex:- $R = \{(L_1, L_2) : L_1 \parallel L_2\}$

i) Refl. $\rightarrow (L_1, L_1) \rightarrow L_1 \parallel L_1 \in R$

iii) Symm. $\rightarrow L_1, L_2 \in R \rightarrow L_1 \parallel L_2$

$\downarrow$

$(L_2, L_1) \in R \rightarrow L_2 \parallel L_1$

iii) Trans — $(L_1, L_2) \in R$ & $(L_2, L_3) \in R$

$\downarrow$

$(L_1, L_3) \in R$ ∎

Ans $\rightarrow y = 2x + 4$

Write the set of 9 lines which is $\parallel$ to given line

$y = 2x + c$