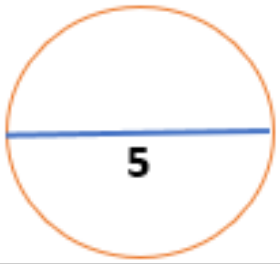
Name: .....

Code: .....



Q1	1 If the point $(x, 7)$ lies on the y-axis, then $5x + 1 =$ ..... « Port Said 17 » (a) zero (b) 1 (c) 5 (d) 6
Q2	If $x \in \mathbb{R}_-$, then the point $(-x, \sqrt[3]{x})$ lies in the ..... quadrant. « El-Monofia 20 » (a) first (b) second (c) third (d) fourth
Q3	If $n(X^2) = 4$, $n(X \times Y) = 6$, then $n(Y) =$ ..... « South Sinai 17 » (a) 2 (b) 3 (c) 4 (d) 6
Q4	If $(x - 3, 2 - x)$ lies in the fourth quadrant, then $x =$ ..... « El-Dakahlia 20 » (a) 4 (b) 3 (c) 2 (d) 1
Q5	If $X = \{2\}$, $Y = \{3, 4, 5\}$, **find :** 1 $X \times Y$ 2 $n(Y^2)$ 3 X^2

4 if $X = \{3\}$ $y = \{7\}$

Find ① $n(X \times y) = n(X) \times n(y) = 1 \times 1 = 1$

② $n(X^2) = 1^2 = 1$

③ $n(y^2) = 1^2 = 1$

④ X^2

Soln

$X^2 = X \times X = \{1\} \times \{1\} = \{(1,1)\}$

if $x \times y = [(1,1), (1,3), (1,5)]$

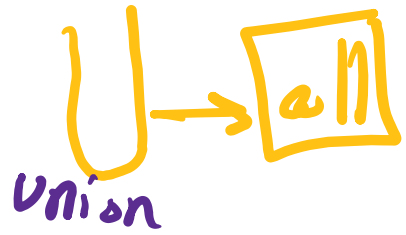
$x = \{1\}$

$y = [1, 3, 5]$

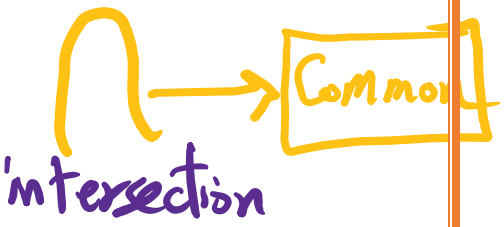
$y \times x = [(1,1), (3,1), (5,1)]$

$x = [1, 5]$ $y = [4, 5, 6]$

① $x \cup y = [1, 5, 4, 6]$

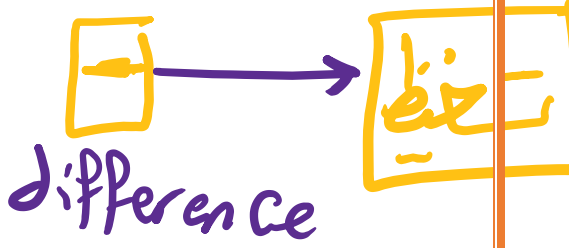


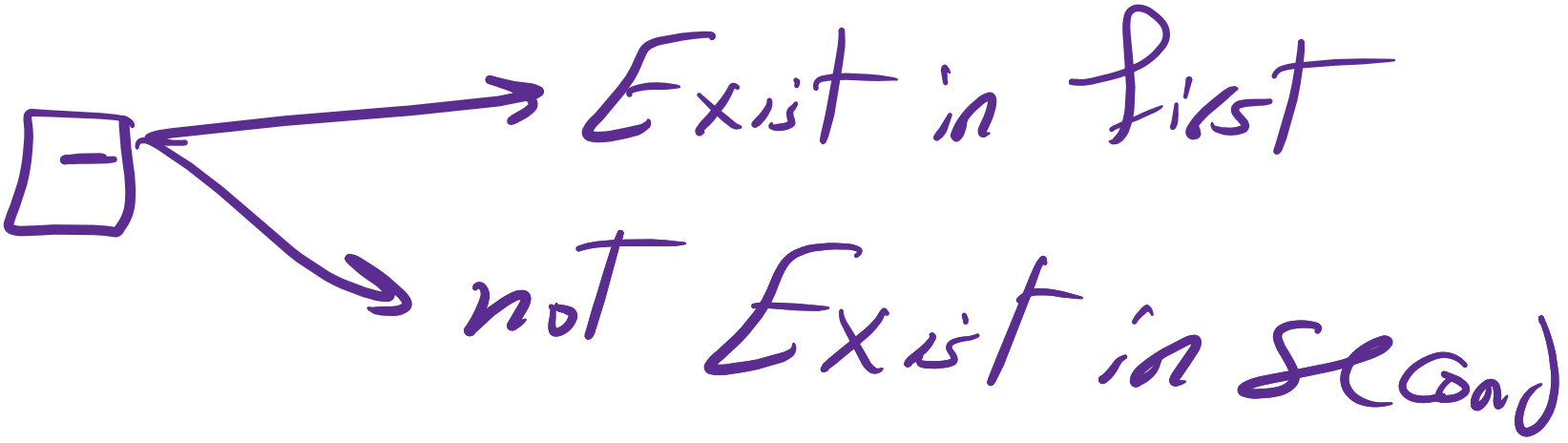
② $x \cap y = [5]$



③ $x - y = [1]$

④ $y - x = [4, 6]$




Exist in first
not Exist in second

6 if $X = \{3, 4\}$ $Y = \{4, 5\}$

$Z = \{5, 6\}$.

Find:

1. $X \times (Y \cap Z)$ ② $(X - Y) \times Z$

3. $(X - Y) \times (Y - Z)$

1. $X \times (Y \cap Z) = \{3, 4\} \times \{5\} = \{(3,5), (4,5)\}$

2. $(X - Y) \times Z = \{3\} \times \{5, 6\} = \{(3,5), (3,6)\}$

3. $(X - Y) \times (Y - Z)$

$\{3\} \times \{4\} = \{(3,4)\}$

Q: If $X = \{1\}$ $Y = \{2, 3\}$

$Z = \{2, 5, 6\}$

Find ① $(X \times Y) \cap (X \times Z)$

② $(X \times Y) \cup (X \times Z)$

Soln

$X \times Y = \{(1,2), (1,3)\}$

$X \times Z = \{(1,2), (1,5), (1,6)\}$

① $(X \times Y) \cap (X \times Z) = \{(1,2)\}$

② $(X \times Y) \cup (X \times Z) = \{(1,2), (1,3), (1,5), (1,6)\}$

If $X = \{1, 3, 5\}$, $Y = \{4, 5\}$ **Find :** $(X \cap Y) \times (X \cup Y)$

$(X \cap Y) \times (X \cup Y)$

$\{5\} \times \{1, 3, 4, 5\} = \{(5, 1), (5, 3), (5, 4), (5, 5)\}$

Lesson (2)

Relation and Function

علاقة — دالة

$x + y = 6$

Ex (1) If $X = \{1, 2, 3\}$ $Y = \{3, 4, 5, 6\}$

and R is relation from X to Y

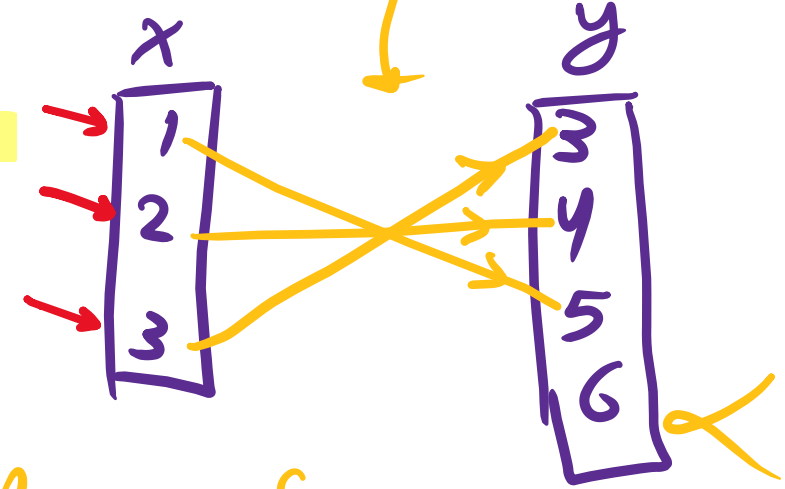
such that $(a\ R\ b)$ means $a + b = 6$ ($x + y = 6$)

For $a \in X$, $b \in Y$ (1) state R

(2) and represent it by an arrow diagram

Soln

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



Range $= \{3, 4, 5\}$

Function

each element in X has only one image in Y

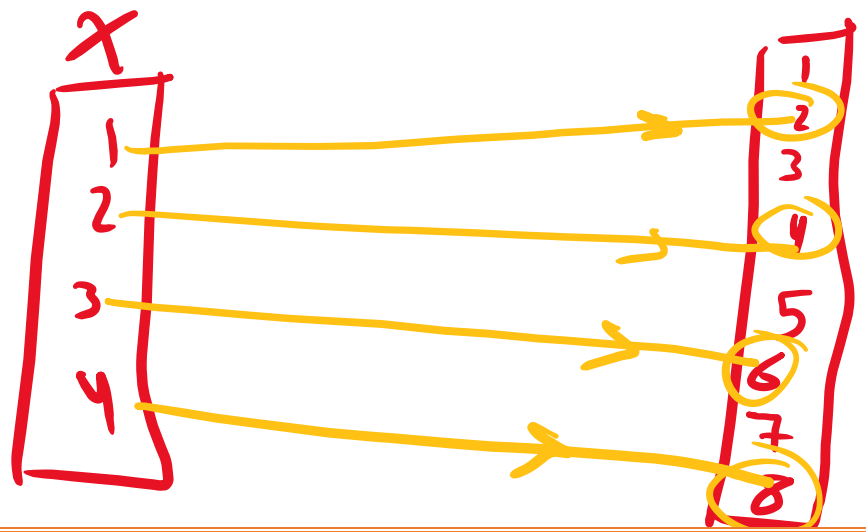
Ex ② $X = \{1, 2, 3, 4\}$ $Y = \{1, 2, 3, 4, 5, 6, 7, 8\}$

"a R b" Means $a = \frac{1}{2} b$ $x = \frac{1}{2} y$

state Relation and represent arrow diagram

Soln

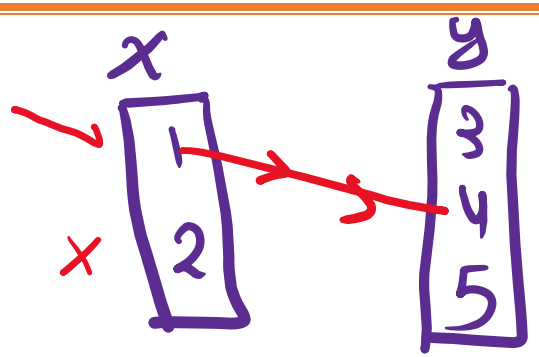
$R = [(1,2), (2,4), (3,6), (4,8)]$



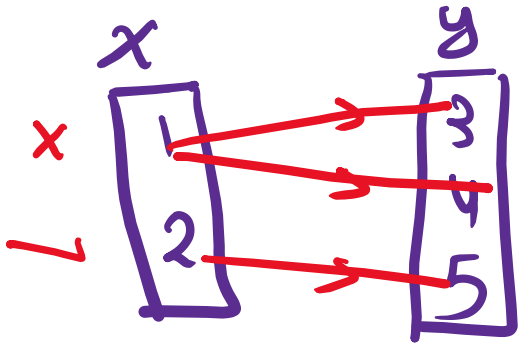
Range = $[2, 4, 6, 8]$

Function

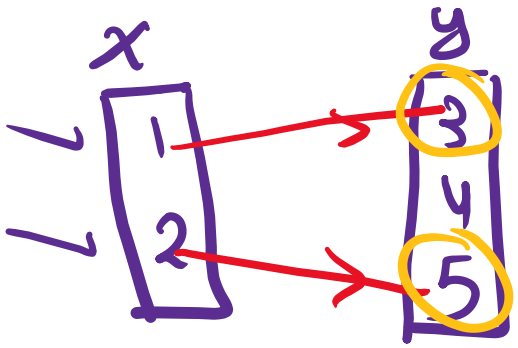
each element in X has only one image in y



not Function "2" has no image



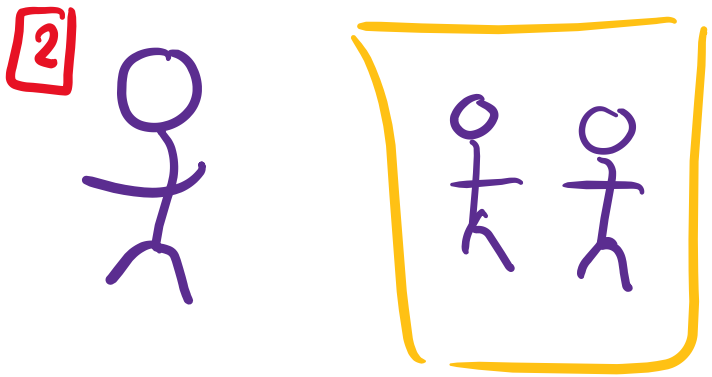
not function "1" has Two image

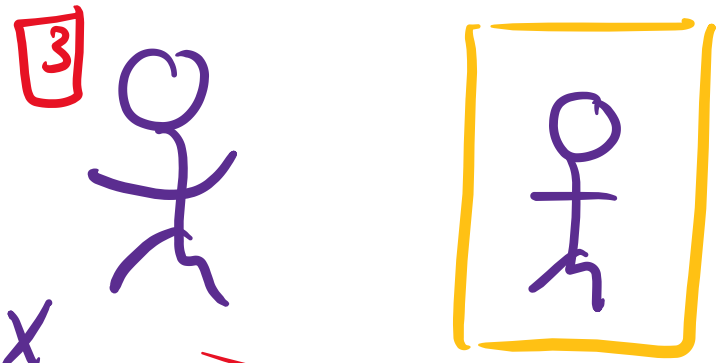


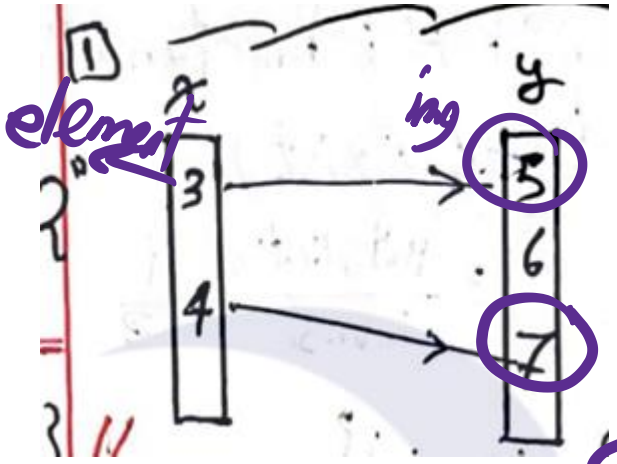
Range = [3,5]

Function

each element in X has only one image in Y







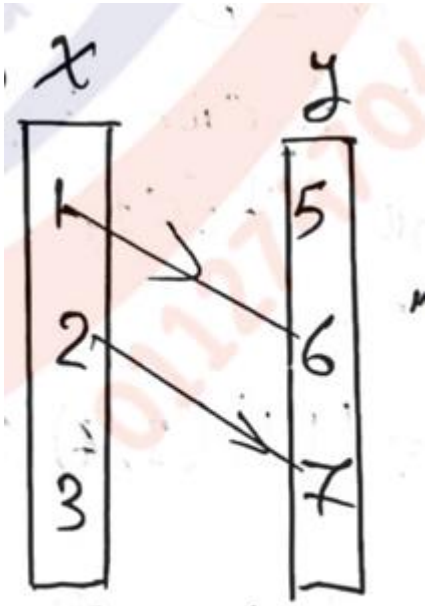
Function

each element in X has only one image in Y

Domain = X = {3, 4}

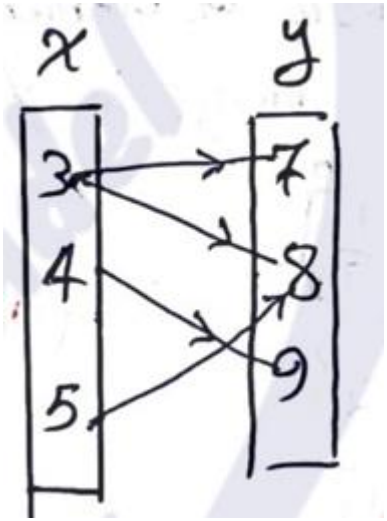
Co-Domain y = {5, 6, 7}

Range = {5, 7}



not function

"3" has no image



not function

"3" has Two image

Range = Not Exist

Range $\subset$ Co-Domain

y

second projection

Range : It's the set of images

Ex③

if $x=\{1,2,3\}$ $y=\{1,\frac{1}{2},\frac{1}{3},\frac{1}{5}\}$

"a R b" means [a Multiplicative inverse b]

① state R, ② Mention if R is function or

③ write its Range (if it Exist)

Soln 3 $\xrightarrow[\text{inverse}]{\text{Multiplicative}}$ $\frac{1}{3}$

$\frac{5}{1} \xrightarrow{M.i} \frac{1}{5}$

$\frac{2}{5} \longrightarrow \frac{5}{2}$

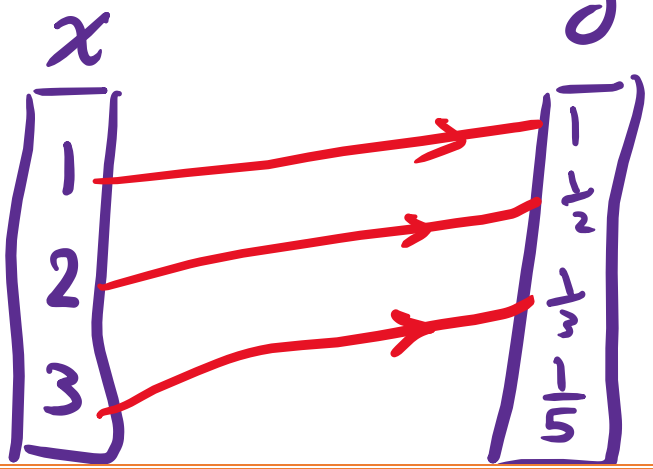
$\frac{-7}{6} \longrightarrow \frac{-6}{7}$

$1 \longrightarrow 1$

$-1 \longrightarrow -1$

$\frac{0}{1} \xrightarrow{M.i} \frac{1}{0}$ = Math Error

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



function

Range $=\{1,\frac{1}{2},\frac{1}{3}\}$

4. $X = \{-1, 0, 1, 2, 3\}$

$y = \{0, 1, 4, 6, 9\}$

$x^2 = y$

$(-1)^2 = 1$

$(0)^2 = 0$

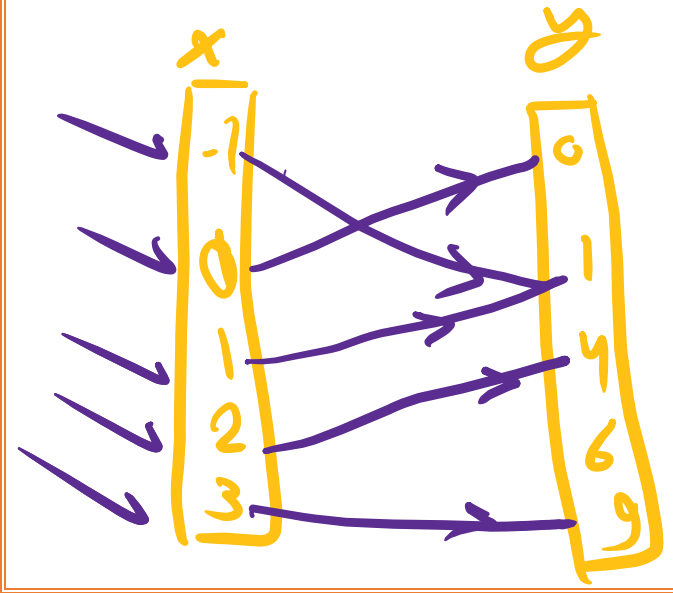
"a Rb" Means $a^2 = b$

state R, Is R Function? Why?

Mention its Range (if Exist)

Soln

$R = \{(-1, 1), (0, 0), (1, 1), (2, 4), (3, 9)\}$



function

each element in x has only one image in y

Range = {0, 1, 4, 9}

[5] If $X = \{2, 5\}$

$Y = \{1, 4, 7\}$ $X < Y$

e "a R b" means $a < b$

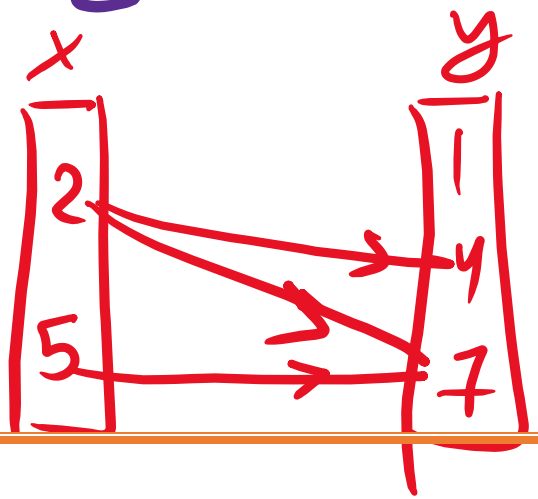
VoT

[1] state R [2] Is R function? why

[3] Represent R by arrow diagram

Soln

$$R = \{(2,4), (2,7), (5,7)\}$$



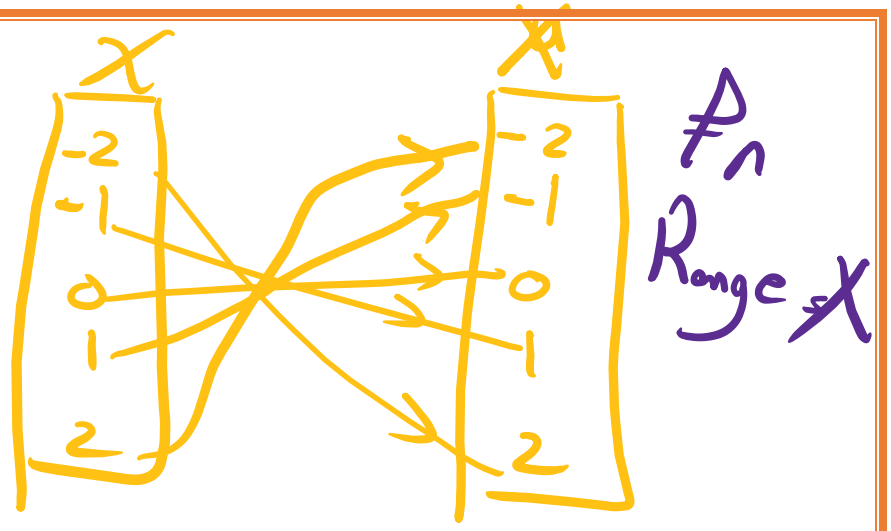
not function

"2" has Two images

(6) if $X = \{-2, -1, 0, 1, 2\}$

"a R b" "a additive inverse to b"

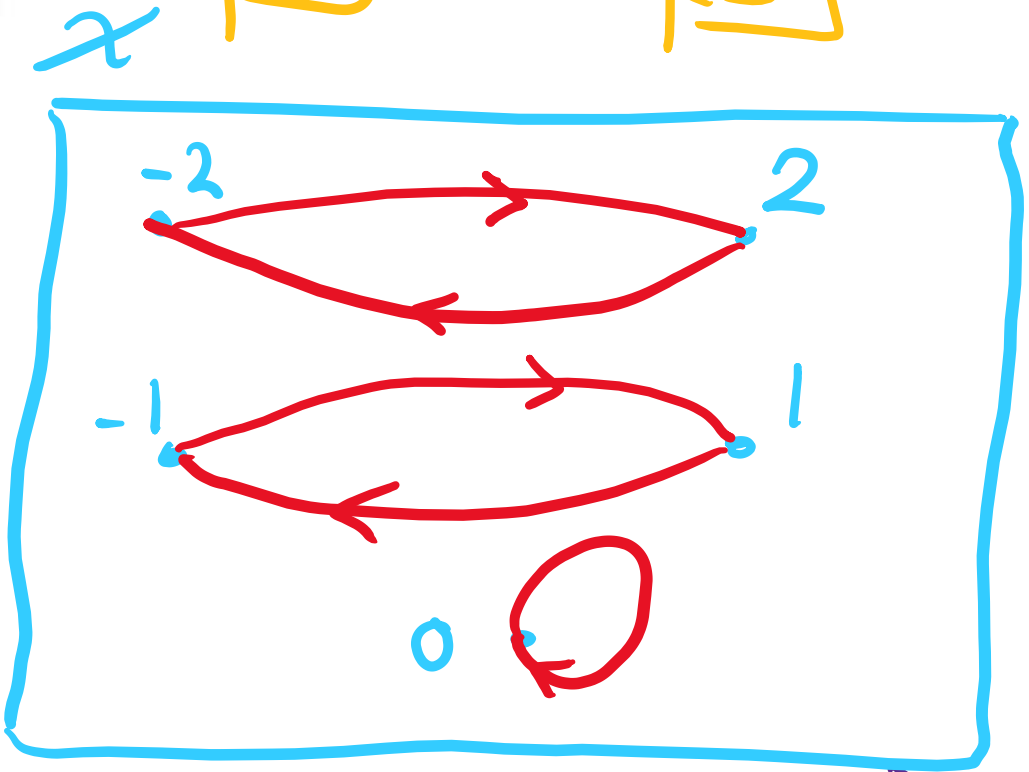
stat the Relation R; $a, b \in X$



Soln

$X = \{-2, -1, 0, 1, 2\}$

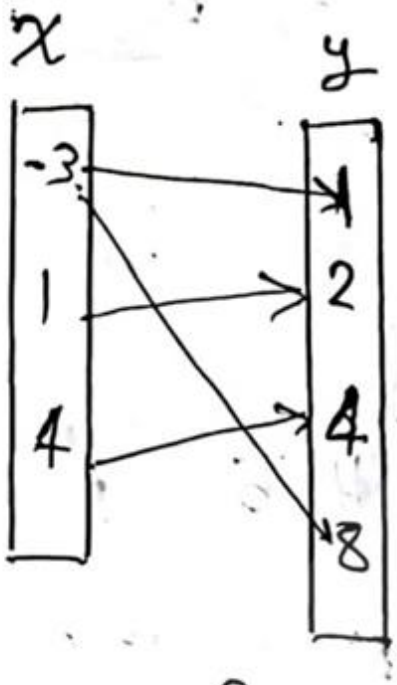
$X = \{-2, -1, 0, 1, 2\}$



$R = \{(-2, 2), (-1, 1), (0, 0), (1, -1), (2, -2)\}$

7 if $x = \{-3, 1, 4\}$

$y = \{1, 2, 4, 8\}$



$R = \{(-3,1), (-3,8), (1,2), (4,4)\}$

not function

state R, Is R is function?
Mention its Range.

Range = not Exist

⑨ If $X = \{1, 2, 4, 6, 10\}$

"a R b" means "a Multiple of b"

such that $a \in X$, $b \in X$

$\frac{x}{y}$ = integer

State R ? Is R fn ? Why?

not Function

2, 4, 6 has More than one image

a Multiple of b

$a \div b$

$X = \{1, 2, 4, 6, 10\}$

$X = \{1, 2, 4, 6, 10\}$

$R = \{(1,1), (2,1), (2,2), (4,1), (4,2), (4,4), (6,1), (6,2), (6,6), (10,1), (10,2), (10,10)\}$

8) if $x = \{2, 3, 4\}$ $y = \{6, 8, 10, 11, 15\}$

"a R b" Means "a divides b"

"a factor of b"

$\frac{y}{x}$ = integer

state R?

Soh $b \div a$

$R = \{(2,6), (2,8), (2,10), (3,6), (3,15), (4,8)\}$

not function

2, 3 has more than one image

Prime = { even 2, 3, 5, 7, 11, 13, 17, 19, 23, ... }

odd = { 1, 3, 5, ---- }

even = { 0, 2, 4, ------- }

Prime numbers = { 2 , 3 , 5 , 7 , 11 , 13 , 17 , 19 , 23 , 29 , 31 , 37 }

Odd numbers = { 1 , 3 , 5 , 7 , 9 , 11 , 13 , 15 , 17 , 19 , ... }

Even numbers = { 0 , 2 , 4 , 6 , 8 , 10 , 12 , 14 , 16 , 18 , 20 , ... }

If $X = \{3, 2, 1, 0, \frac{1}{2}, \frac{1}{3}\}$, and R is a relation on X

where "a R b" means "a is the multiplicative inverse of b"

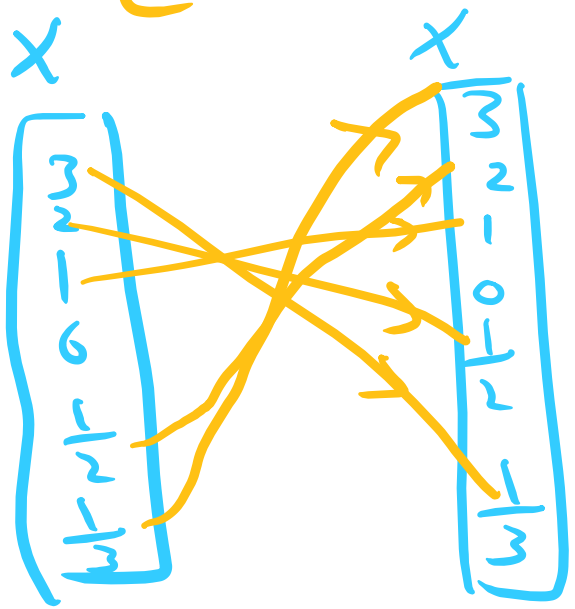
for each $a \in X$, $b \in X$

Write R and represent it by an arrow diagram and mention giving reasons if R represents a function or not.

$X = \{3, 2, 1, 0, \frac{1}{2}, \frac{1}{3}\}$

$X = \{3, 2, 1, 0, \frac{1}{2}, \frac{1}{3}\}$

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



not function

Zero has no image

If the function $f = \{(0, 4), (1, 3), (2, 2), (3, 1)\}$

1 Write each of domain and range of the function f

2 Write the rule of the function f

$f(x) = ax \pm Test$

1 Domain $= \{0, 1, 2, 3\}$

Range $= \{4, 3, 2, 1\}$

$-1 \quad -1 \quad -1$

2 $f(x) = -x + 4$

If the set of the function $f = \{(1, 3), (2, 5), (3, 7), (4, 9), (5, 11)\}$

(1) Write the domain and the range of the function f

(2) Write the rule of the function f

$F(x) = dx \pm Test$

$F(x) = 2X + 1$