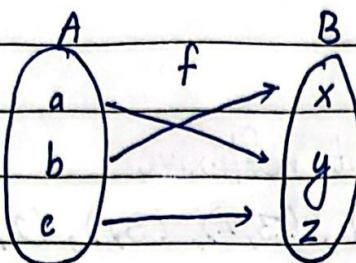


Week 11 : Tutorial (1)

1.

i)

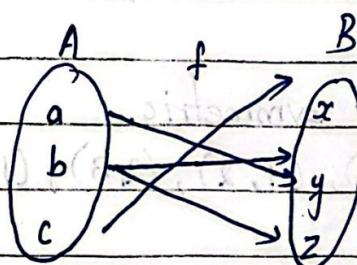


$$(a, x), (b, y), (c, z)$$

Range:
 $\{x, y, z\}$

\therefore It defines $f: A \rightarrow B$

ii.

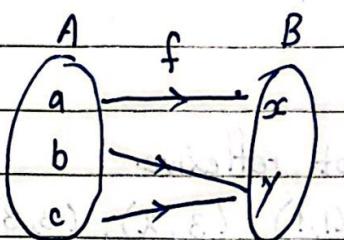


$$\{(a, x), (a, y), (a, z)\}$$

This is not $f: A \rightarrow B$ because in domain b has two

range y & z.

iii.



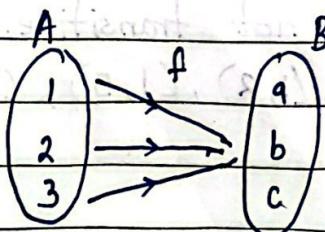
$$(a, x), (b, y), (c, y)$$

Range:

$$\{x, y\}$$

It defines $f: A \rightarrow B$

iv)

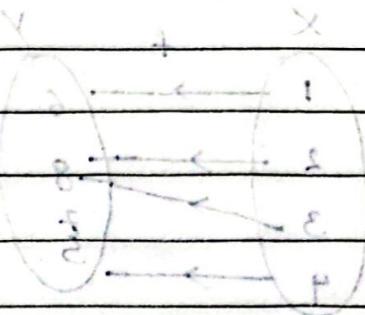
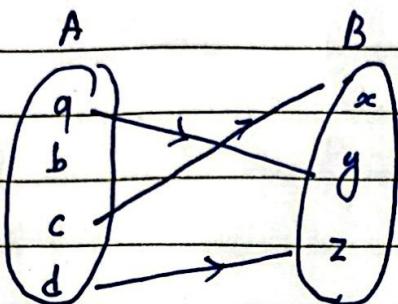


$$(1, a), (2, b), (3, c)$$

Range
 $\{b\} \not\in$

Yes, it defines $f: A \rightarrow B$ because each domain can have same range.

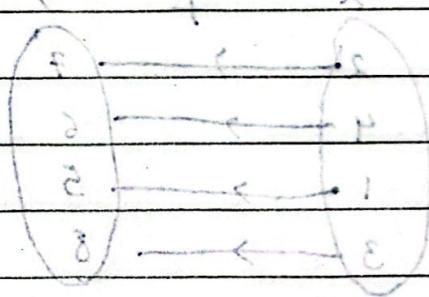
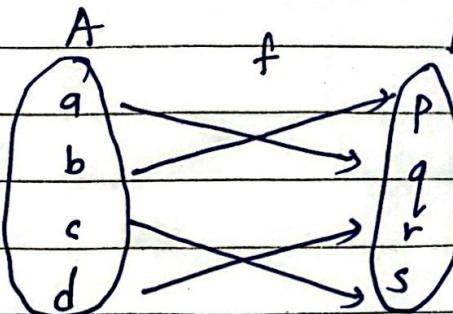
v>



$x \leftarrow x : f$ without a \rightarrow \exists
 $\{2, 3, 4\} = \text{spur}$

It is not a function because domain $\{b\}$ does not have a range

vi)



$x \leftarrow x : f$ without a \rightarrow \exists

It is a function $f: A \rightarrow B$ because each domain consists of 1 range.

$(a, p), (b, q), (c, r), (d, s)$

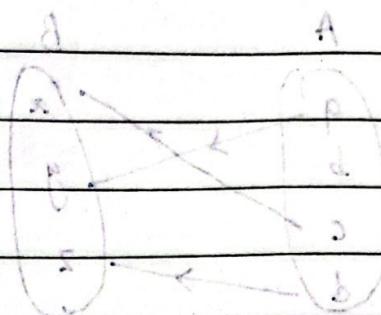
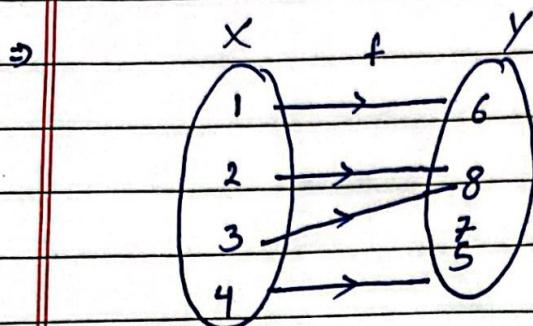
Range = $\{q, p, r, s\}$

send to each & removed with a few \exists \rightarrow

Scanned with

Ques 2. Is the given below defined as a function? If yes, find its range.

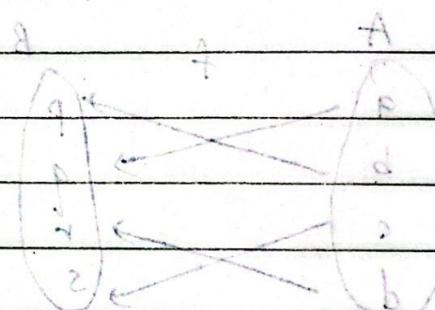
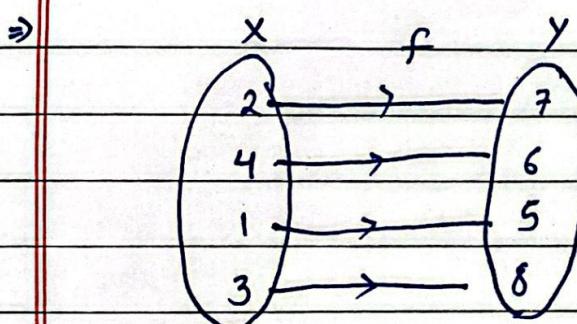
i.



It is a function $f: X \rightarrow Y$

$$\text{Range} = \{6, 8, 5\}$$

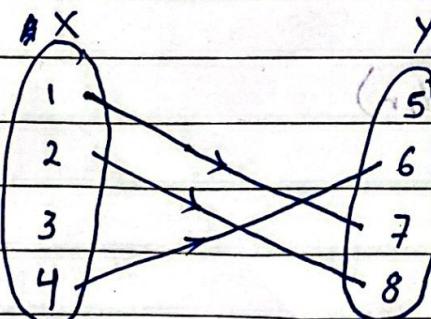
ii.



It is a function $f: X \rightarrow Y$

$$\text{Range} = \{5, 6, 7, 8\}$$

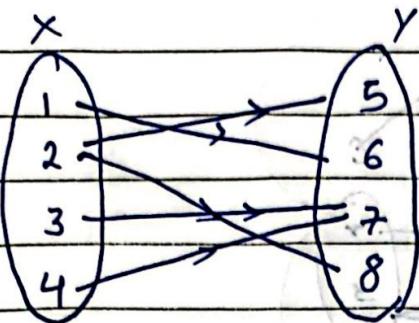
iii.



$(1, 5), (2, 6), (3, 7), (4, 8)$
 $\{2, 4, 6, 8\} = \text{range}$

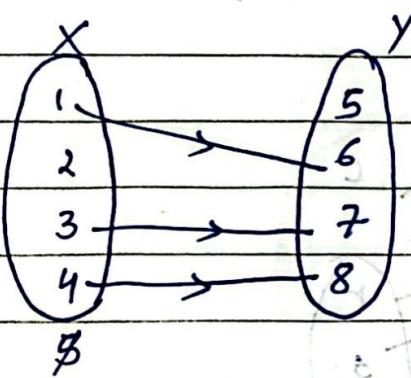
It is not a function because 3 does not have its range.

iv.



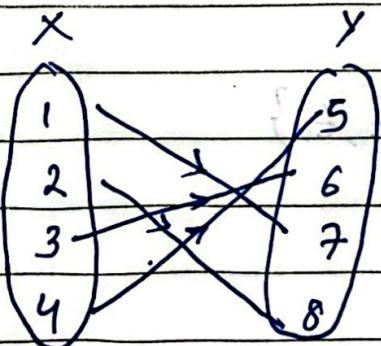
It is not a function because ^{domain} 2 has two different range.

v.



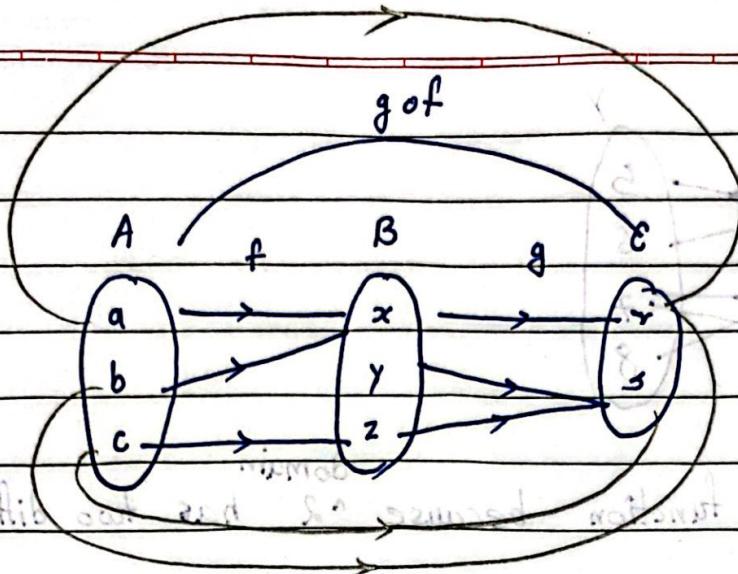
It is not a function because domain 2 does not have any range.

vi.



It is a function $f: X \rightarrow Y$
Range = {5, 6, 7, 8}

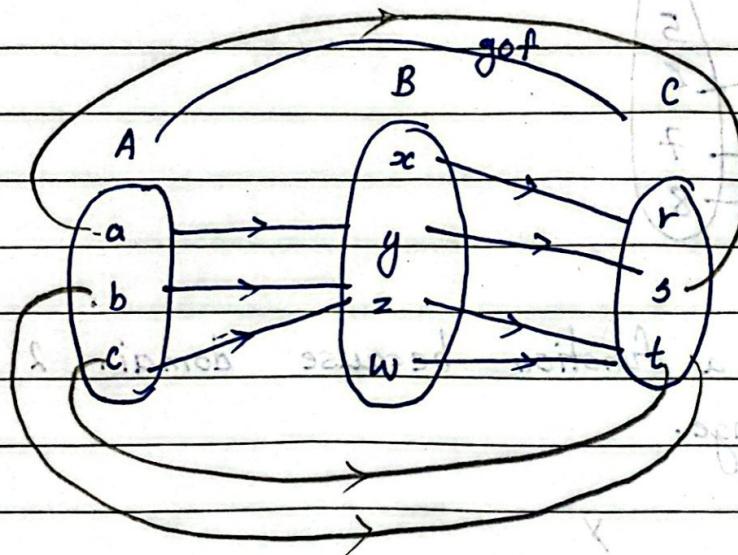
3.



transferring each and every element from domain of f to range of g

$$\therefore gof : A \rightarrow C = \{(a, r), (b, s), (c, r)\}$$

⇒



$$\therefore gof : A \rightarrow C = \{(a, r), (b, s), (c, t)\}$$

4.

$$\Rightarrow f(x) = 1 + 2x$$

$$g(x) = x^2 - 1$$

a) $gof(x)$

$$\Rightarrow g[f(x)]$$

$$\begin{aligned}
 &= g(1+2x) \\
 &= (1+2x)^2 - 1 \\
 &= 1 + 4x + 4x^2 - 1 \\
 &= 4x + 4x^2
 \end{aligned}$$

b) $fog(x)$

$$\begin{aligned}
 &\Rightarrow f[g(x)] \\
 &= f(x^2 - 1) \\
 &= 1 + 2(x^2 - 1) \\
 &= 1 + 2x^2 - 2 \\
 &= 2x^2 - 1
 \end{aligned}$$

c) $fof(x)$

$$\begin{aligned}
 &= f[f(x)] \\
 &= f(1+2x) \\
 &= 1 + 2(1+2x) \\
 &= 1 + 2 + 4x \\
 &= 3 + 4x
 \end{aligned}$$

d) $gog(x)$

$$\begin{aligned}
 &= g[g(x)] \\
 &= g[x^2 - 1] \\
 &= (x^2 - 1)^2 - 1 \\
 &= x^4 - 2x^2 + 1 - 1 \\
 &= x^4 - 2x^2
 \end{aligned}$$

5.

$$a) f(x) = 2x - 1$$

$$\text{i.e. } y = 2x - 1$$

Interchanging values of x & y ;

$$x = 2y - 1 \quad [\text{Solving}]$$

$$x - 1 = 2y$$

$$\therefore y = \frac{x-1}{2}$$

$$\therefore f^{-1}(x) = \frac{x-1}{2}$$

$$b) f(x) = 4x^2 - 1$$

$$\text{i.e. } y = 4x^2 - 1$$

Interchanging the values of x and y ;

$$x = 4y^2 - 1 \quad [\text{Solving}]$$

$$\text{or, } x - 1 = 4y^2$$

$$\Rightarrow \frac{x-1}{4} = y^2$$

$$\Rightarrow y = \sqrt{\frac{x-1}{4}} \Rightarrow f^{-1}(x) = \frac{\sqrt{x-1}}{2}$$

This is ^{valid} satisfies for the values of $x \geq 1$

$$c) f(x) = \frac{x}{x-2}$$

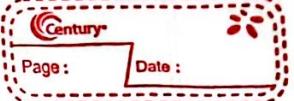
$$\text{i.e. } y = \frac{x}{x-2}$$

Interchanging the values of x and y ;

$$x = \frac{y}{y-2}$$

FUNCTION APPROXIMATION

↳ AI की Basics.



$$\Rightarrow \frac{y-2}{y} = \frac{1}{x} \quad \text{when } x \neq 0 \quad \theta = 0 \quad R =$$

$$\Rightarrow \frac{x-2}{y} = \frac{1}{x} \quad \text{when } x \neq 0 \quad R = P = (0 \times 0)$$

$$\Rightarrow 1 - \frac{2}{y} = \frac{1}{x} \quad \text{when } x \neq 0 \quad \theta =$$

$$\Rightarrow 1 - \frac{1}{x} = \frac{2}{y} \quad \therefore = (x) \text{ of } \therefore$$

$$\Rightarrow \frac{x-1}{x} = \frac{2}{y}$$

$$\Rightarrow y = \frac{2x}{x-1}$$

Next 3. i.e. 6

$$\Rightarrow f(x) = (2x+1) \pmod{6}$$

$$g(x) = (3x-1) \pmod{6}$$

$$\begin{aligned} f \circ g(x) &= f[g(x)] \\ &= f(3x-1) \\ &= 2(3x-1) + 1 \\ &= 6x - 2 + 1 \\ &= 6x - 1 \end{aligned}$$

$$\begin{aligned} g \circ f(x) &= g[f(x)] \\ &= 3(2x+1) - 1 \\ &= 6x + 3 - 1 \\ &= 6x + 2 \end{aligned}$$

$$\text{When } x = 1, \quad f \circ g(x) = 5 \pmod{6} \\ = 5$$

$$\text{When } x = 2, \quad f \circ g(x) = 11 \pmod{6} \\ = 5$$

$$\text{When } x = 3, \quad f \circ g(x) = 17 \pmod{6} \\ = 5$$

When $x=4$, $fog(x) = 23 \pmod{6}$

$$= 5$$

When $x=5$, $fog(x) = 29 \pmod{6}$

$$= 5$$

When $x=6$, $fog(x) = 35 \pmod{6}$

$$= 5$$

Subsets $\Rightarrow \{(1,5), (2,5), (3,5), (4,5), (5,5), (6,5)\}$

$$\therefore fog(x) =$$

$$gof(x) = 6x + 2 \quad [\text{अतीव लोकित}]$$

$$=$$

\therefore When $x=1$, $gof(x) = 8 \pmod{6}$

$$= 2$$

When $x=2$, $gof(x) = 14 \pmod{6}$

$$= 2$$

When $x=3$, $gof(x) = 20 \pmod{6}$

$$= 2$$

When $x=4$, $gof(x) = 26 \pmod{6}$

$$[(x)4]_B = (x) = 2$$

$$[(x)4]_A = (x) = 2$$

When $x=5$, $gof(x) = 32 \pmod{6}$

$$1+8+2x = 2$$

$$(1+x)2 =$$

When $x=6$, $gof(x) = 38 \pmod{6}$

$$= 2$$

$$1+2x =$$

Subset

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