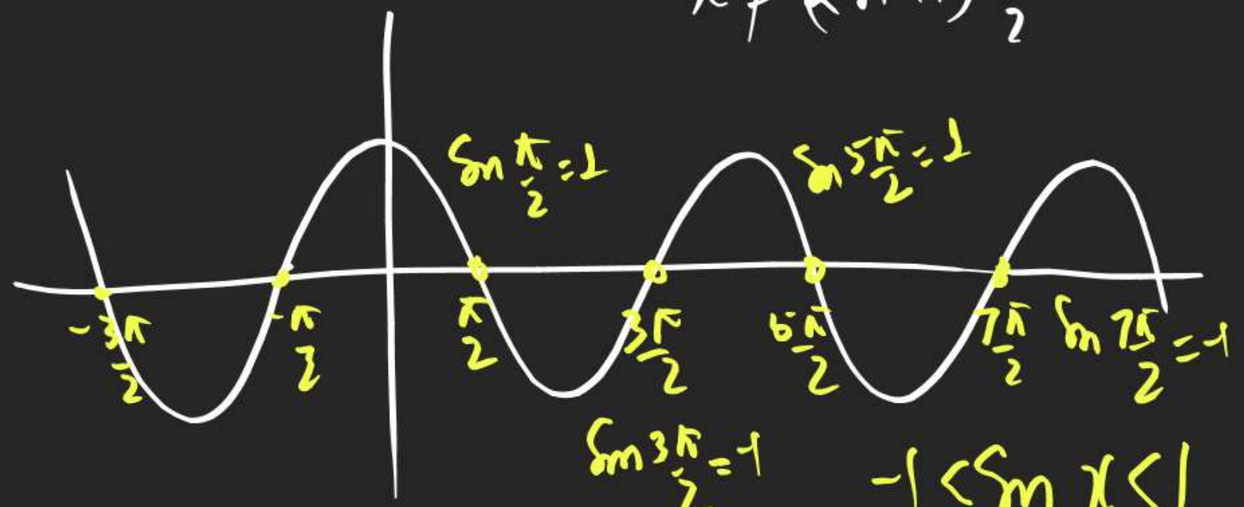
Nishant Jindal

RELATION FUNCTION

Q.25 $y = 4\tan x \cdot \cos x$.

$= 4\dfrac{\sin x}{\cos x} \times \cos x \quad \cos x \neq 0$

$x \neq (2n+1)\dfrac{\pi}{2}$



$-1 < \sin x < 1$

$-4 < 4\sin x < 4$

$d(x) = 4\sin x \in [-4,4] \times$

$\in (-4,4)$

$y = \dfrac{1}{9\sin x - 3} \to \dfrac{1}{x}$

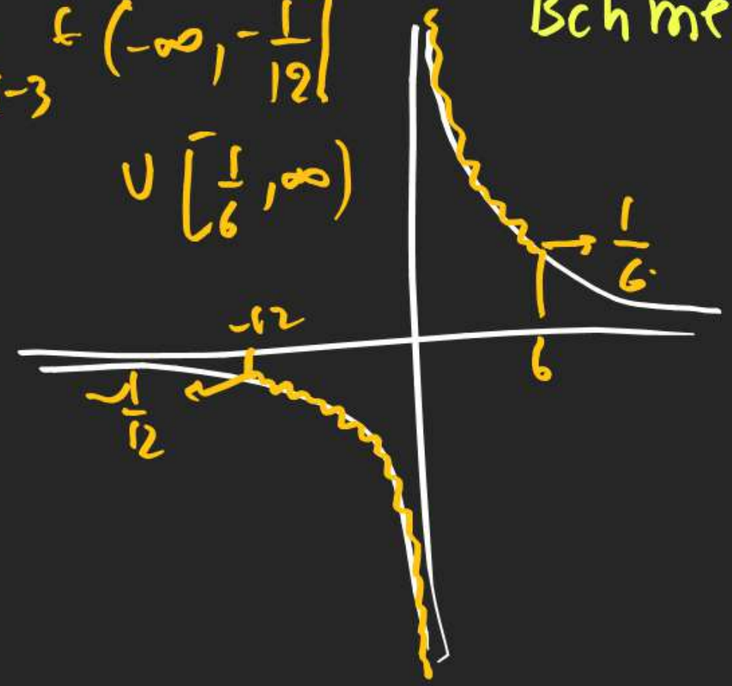
(correction)

$-9 \le 9\sin x \le 9$

$-12 \le 9\sin x - 3 \le 6$

Both me Zero

$\dfrac{1}{9\sin x - 3} \in \left(-\infty, -\frac{1}{12}\right] \cup \left[\frac{1}{6}, \infty\right)$



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RELATION FUNCTION

Q26 $y = \sin\sqrt{x}$'s R_f?

theta

$\sqrt{x} \in [0, \infty)$

$\sin\sqrt{x} \in [-1, 1]$

Q27 $y = 3 - 2^x$ R_f?

$0 < 2^x < \infty$

$0 > -2^x > -\infty$

$3 > 3 - 2^x > -\infty \quad \therefore y \in (-\infty, 3)$

Q28 $y = 4^x + 2^x + 1$ R_f?

$y = 4^x + 2^x + 1$

$> 0 > 0 + 1$

$\rightarrow (1, \infty)$

$2^x = t \Rightarrow$

$y = t^2 + t + 1 \; ; \; t = 2^x \in (0, \infty)$

Q Eqn ka Graph Banao.

$\frac{dy}{dt} = 2t + 1 = 0 \Rightarrow t = -\frac{1}{2}$

$y = \left(-\frac{1}{2}\right)^2 + \frac{1}{2} + 1 = \frac{3}{4}$

$\left(-\frac{1}{2}, \frac{3}{4}\right)$

$y = 0^2 + 0 + 1 = 1$

$\therefore y \in (1, \infty)$

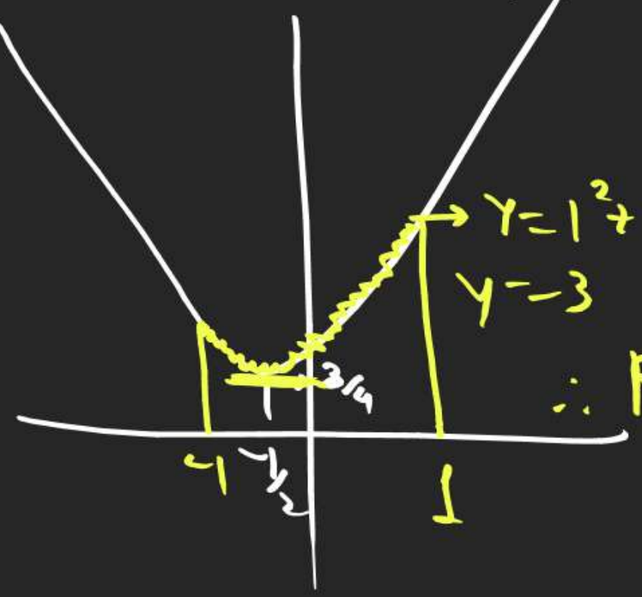
Nishant Jindal

RELATION FUNCTION

Q29 $y = \sin^2 x + \sin x + 1$

$\sin x = t$

$y = t^2 + t + 1 \; ; \; t = \sin x \in [-1, 1]$



$\therefore R_f \in \left[\frac{3}{4}, 3\right]$

$y = \frac{ax+b}{(cx+d)}$

$R_f \to y \in R - \left\{\frac{a}{c}\right\}$

$D_f \to x \in R - \left\{-\frac{d}{c}\right\}$

Q $y = (\sin^{-1} x)^2 + \sin^{-1} x + 1 \to \sin^{-1} x \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Q30 $y = \frac{2x-3}{3x+4}$ find R_f ? $y = \frac{\text{linear}}{\text{linear}}$

$3xy + 4y = 2x - 3$

$3xy - 2x = -3 - 4y$

$x(3y-2) = -3 - 4y$

$x = \frac{4y+3}{2-3y}$ ⇐ Isko dom.

$2 - 3y \neq 0 \Rightarrow y \neq \frac{2}{3}$

$y \in R - \left\{\frac{2}{3}\right\}$

Nishant Jindal

RELATION FUNCTION

Q $y = \dfrac{x^2-5x+4}{x^2+2x-3}$ find R_f?

factorise karo

$y = \dfrac{(x-1)(x-4)}{(x+3)(x-1)}$ $\quad x \neq 1$, $x-1 \neq 0$

$\lim\limits_{x\to 1} \dfrac{x-4}{x+3} = \dfrac{1-4}{1+3} = \dfrac{-3}{4}$

$\hookrightarrow D_f \to R-\{-3,1\}$

Df me x=1 Nhi hai ∴ (x-1) Cancel Kr diya.

$y = \dfrac{x-4}{x+3} \to R-\{1, -\dfrac{3}{4}\}$

Q 32 Form Graph of $y = \dfrac{x-4}{x+3}$

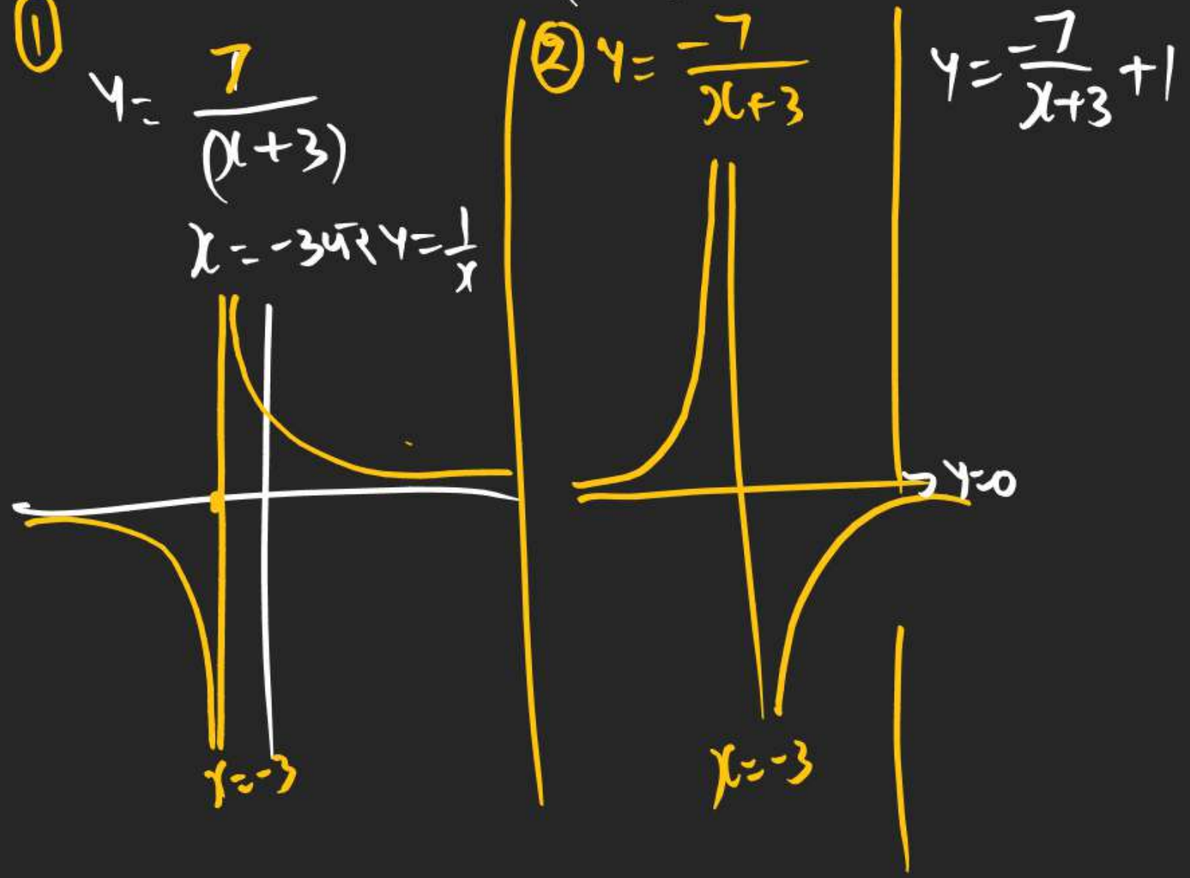
$y = \dfrac{(x+3)-7}{(x+3)} = 1 - \dfrac{7}{(x+3)}$

① $y = \dfrac{7}{(x+3)}$

x = -3 पर $y = \frac{1}{x}$

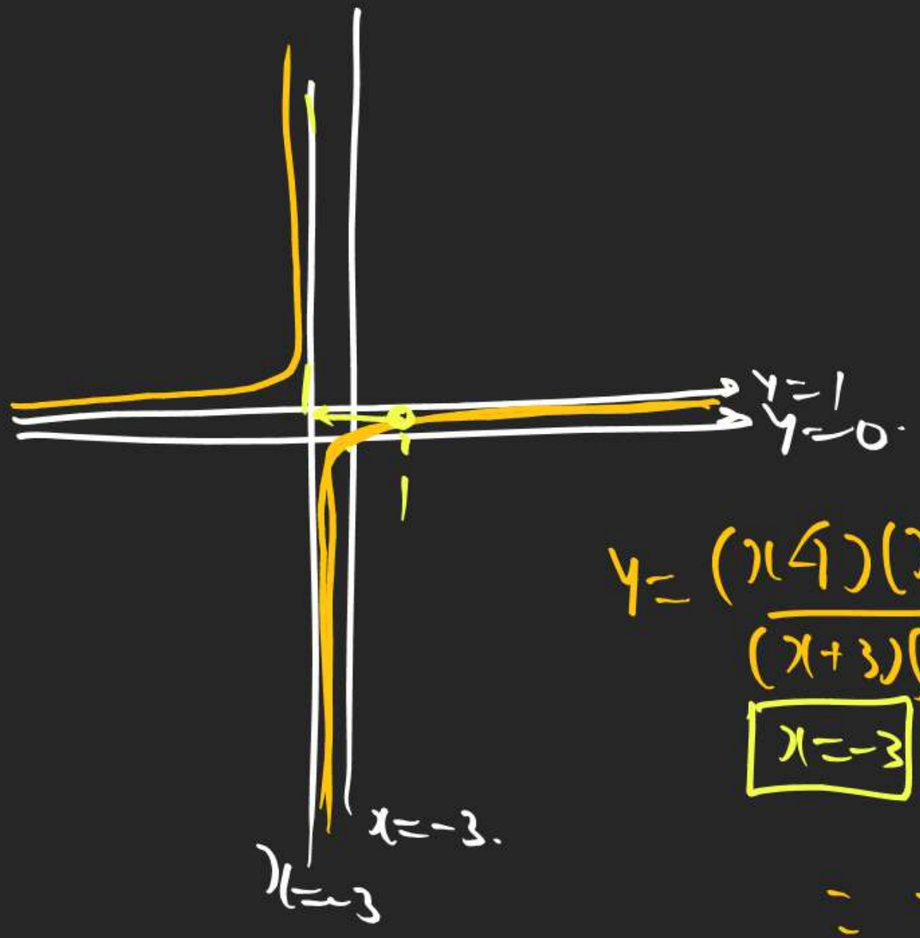
② $y = \dfrac{-7}{x+3}$

$y = \dfrac{-7}{x+3} + 1$



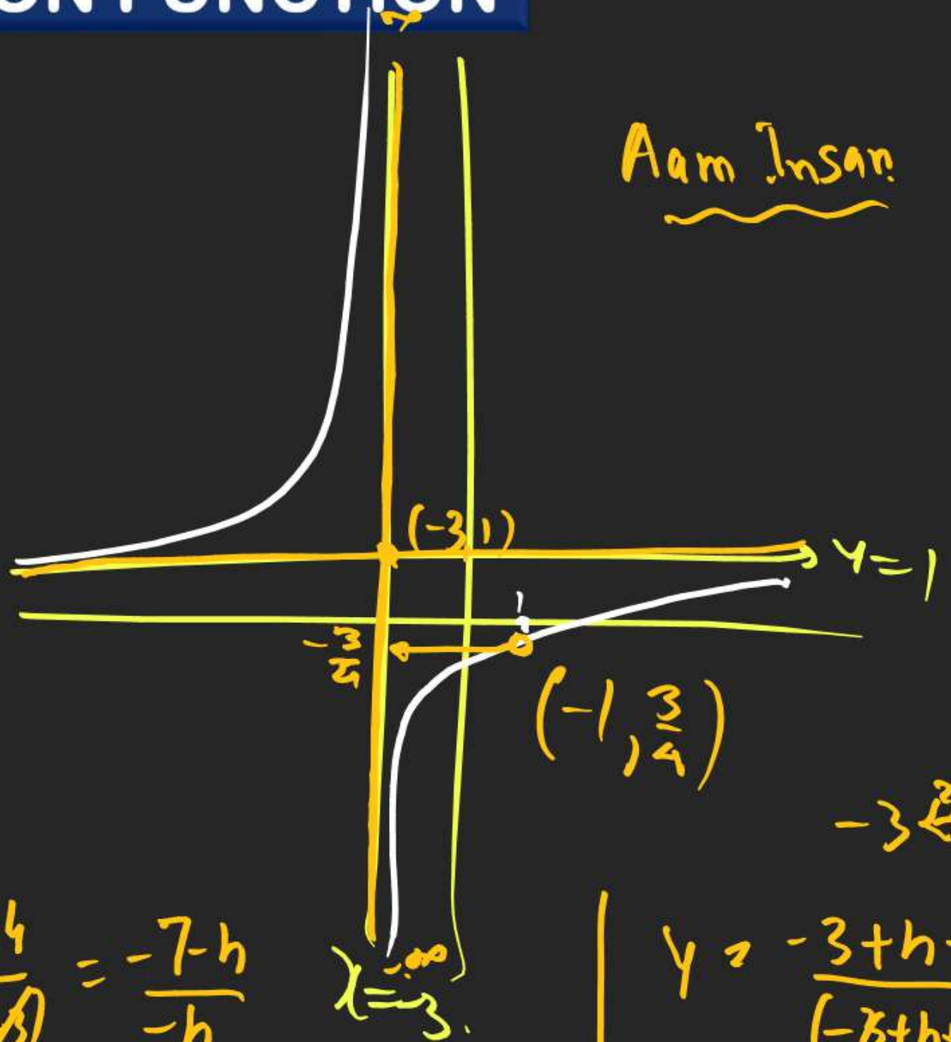
Nishant Jindal

RELATION FUNCTION



$$y = \frac{(x+4)(x-4)}{(x+3)(x-1)}$$

$x = -3$



Aam Insan

$$= \frac{-3-h-4}{(-3-h+3)} = \frac{-7-h}{-h}$$

$$= \frac{7+h}{h} \to \infty$$

-3 से बाएँ

$$y = \frac{-3+h-4}{(-3+h+3)} = \frac{-7+h}{h} \to -\infty$$

Nishant Jindal

RELATION FUNCTION

Q33. $y = \frac{x^2-x+1}{x^2+x+1}$ find R_f.

factorise try किया नहीं हुआ → C.M.

$x^2y + xy + y = x^2 - x + 1$

$x^2(y-1) + x(y+1) + (y-1) = 0$ → Now it is a Quad. Eqn

$y \neq 1$ ←

$D \geq 0$

$(y+1)^2 - 4(y-1)(y-1) \geq 0$

$A^2 - B^2$ ← $(y+1)^2 - (2(y-1))^2 \geq 0$

$\{(y+1)+2(y-1)\}\{(y+1)-2(y-1)\} \geq 0$

⇒ Jinda Rhna Chahta hai to $D \geq 0$ ho

$(3y-1)(-y+3) \geq 0$

$(3y-1)(y-3) \leq 0$

$\frac{1}{3} \leq y \leq 3$

$y \in \left[\frac{1}{3}, 3\right] - \{1\}$

$1 = \frac{x^2-x+1}{x^2+x+1}$

$x^2+x+1 = x^2-x+1$

$2x = 0$

$x = 0$

Nishant Jindal

RELATION FUNCTION

Q34 find $y = \sqrt{x-3} + \sqrt{5-x}$ find R_f

$y = \sqrt{x^2-3} + \sqrt{5-x^2}$

$y = \sqrt{x} \Rightarrow \frac{dy}{dx} = \frac{1}{2\sqrt{x}} \times x$

$y = \sqrt{-x} \Rightarrow \frac{dy}{dx} = \frac{1}{2\sqrt{-x}} \times -1$

Df

$x-3 \geq 0$ $\quad$ $5-x \geq 0$

$x \geq 3$ $\quad$ $x \leq 5$

$x \in [3,5]$ ← Domain

Bounded

2) $\frac{dy}{dx} = \frac{1}{2\sqrt{x-3}} + \frac{1}{2\sqrt{5-x}} \times (0-1)$

$\frac{1}{2\sqrt{x-3}} - \frac{1}{2\sqrt{5-x}} = 0$

$\frac{1}{2\sqrt{x-3}} = \frac{1}{2\sqrt{5-x}} \Rightarrow \sqrt{x-3} = \sqrt{5-x}$

$\Rightarrow x-3 = 5-x \Rightarrow 2x = 8$

$x = 4$

$f(3) = \sqrt{3-3} + \sqrt{5-3} = \sqrt{2}$

$f(5) = \sqrt{5-3} + \sqrt{5-5} = \sqrt{2}$

$f(4) = \sqrt{4-3} + \sqrt{5-4} = 1+1 = 2$

$\therefore R_f \in [\sqrt{2}, 2]$

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RELATION FUNCTION

★ Equal & Identical fxn.

$y = f(x)$ & $y = g(x)$ are Identical

fxn if

A) $D_f = D_g$

B) $R_f = R_g$

C) Socially Eq.
$f(x) = g(x)$

Q $f(x) = \frac{1}{x}$, $g(x) = \frac{x}{x^2}$ is Eq or not?

(1) $x \neq 0$
$x \in R - \{0\}$

$= x \times \frac{1}{x^2}$
R
$x^2 \neq 0$
$\cap$ $x \neq 0$
$x \in R - \{0\}$
$x \in R - \{0\}$

$D_f = D_g$

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

Graphically $f(x)$ & $g(x)$ are same

$\therefore$ fxn is Identical

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RELATION FUNCTION

Q2 $f(x) = e^{\ln x}$ & $g(x) = \ln e^{x}$ Eq?

$x > 0$

$x \in (0, \infty)$

$e^{x} > 0$ ↳ Always

$x \in R$

$x \in (-\infty, \infty)$

$D_f \neq D_g$ ⇒ Not Eq fxn

Q3 $f(x) = \text{Sgn}\{x\}$, $g(x) = \text{Sgn}(x^2 - 4x + 5)$

① $x \in R$ | $x \in R$ (R Poly)

$D_f = D_g$

② $\{x\} \in [0, 1)$

0 → $y = \text{Sgn}\,0 = 0$ | (0,1) → $y = \text{Sgn}(+) = 1$

$y \in \{0, 1\}$

$x^2 - 4x + 5$

$D = 16 - 20 = -ve$

$x^2 - 4x + 5 = +ve$

$y = \text{Sgn}(+ve) = 1$

$y \in \{1\}$

Not Eq

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RELATION FUNCTION

Q $\cot^2 x \cdot \cos^2 x = \cot^2 x - \cos^2 x$

Q $\tan^2 x \cdot \sin^2 x = \tan^2 x - \sin^2 x$

Q4 $f(x) = \cot^2 x \cdot \cos^2 x$ $\quad g(x) = \cot^2 x - \cos^2 x$

① $= \frac{\cos^2 x}{\sin^2 x} \times \cos^2 x$ (R, R) $\quad = \frac{\cos^2 x}{(\sin^2 x)} - \cos^2 x$ (R → R, R → R)

$\sin^2 x \neq 0$

$\sin x \neq 0$

$x \neq n\pi$

$x \in R - \{n\pi\}$ $\quad x \in R - \{n\pi\}$

$D_f = D_g$

② graphically same

⇒ Eq f xn

Q5 $f(x) = \sqrt{\frac{1-\cos 2x}{2}}$, $g(x) = \sin x$ (R)

① $\frac{1-\cos 2x}{2} \geq 0$

$1 - \cos 2x \geq 0$

$\cos 2x \leq 1$

Always True

$x \in R$

Not Eql.

$D_f = D_g$

② $f(x) = \sqrt{\frac{2\sin^2 x}{2}} = |\sin x|$ $\quad g(x) = \sin x$

(3) $R_q \neq R_f$

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RELATION FUNCTION

Q6 $f(x) = x|x|$; $g(x) = x^2 \operatorname{sgn} x$

$x|x|$: $R \cap R$ → R

$x^2 \operatorname{sgn} x$: $R \cap R$ → R

$D_f = D_g$

$x > 0$	$x \cdot x = x^2$	x^2
$x = 0$	$= 0$	0
$x < 0$	$x(-x) = -x^2$	$-x^2$

graphically Same

Identical

Classification of fxn

We have 4 Kind of fxn.

A) One to One → एक एक (Injection)

1-2-1

B) Many to One → बहुएक

M 2 1

C) Onto → आच्छादक (Surjection)

D) Into → अन्तर्वेशी

One to one + Onto = Bijection.

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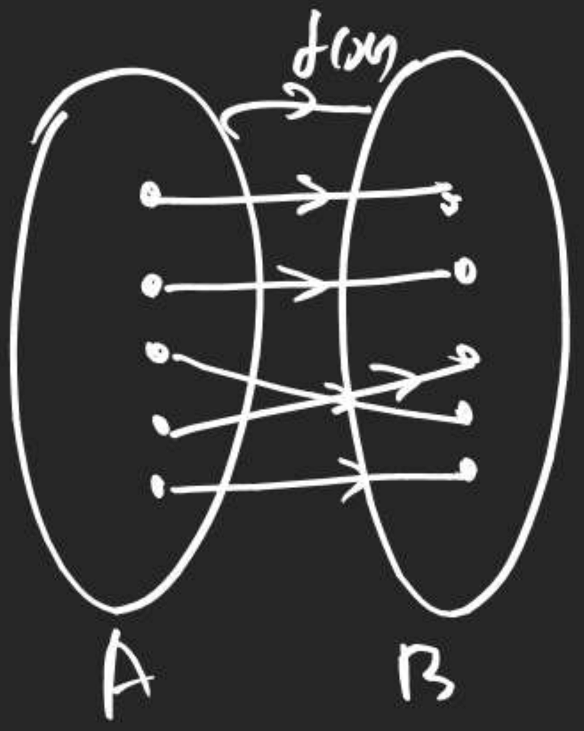
RELATION FUNCTION

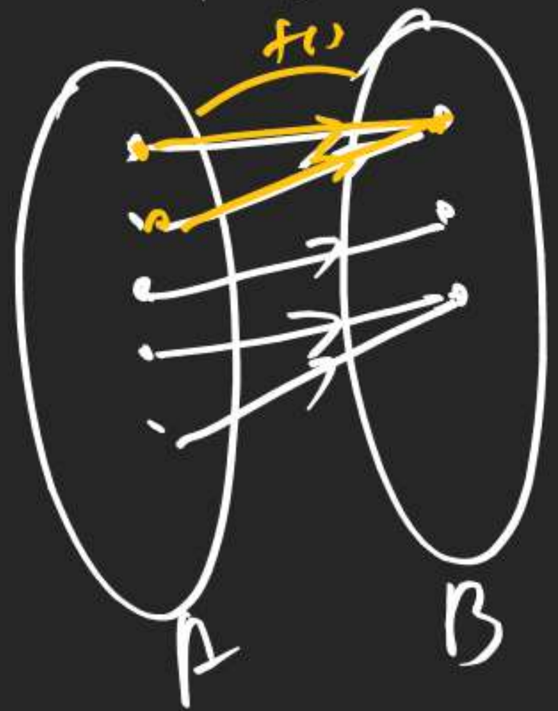
A) One to One

If each element of A is associated with single element of B then 1-2-1
{1 teer 1 Ko Laye}.



(B) Many to One

If 2 or more elements of A are associated with single element of B then it is M21
{2 ya adhik teer 1 Ko Lag Jayen}



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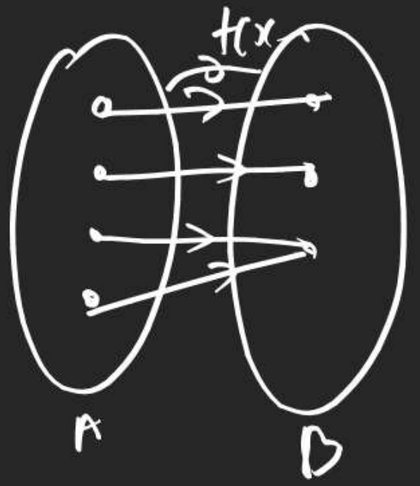
RELATION FUNCTION

(C) Onto fxn Isthem

Onto ← Range = Codomain

{B me Sab ko Teer Lga ho}



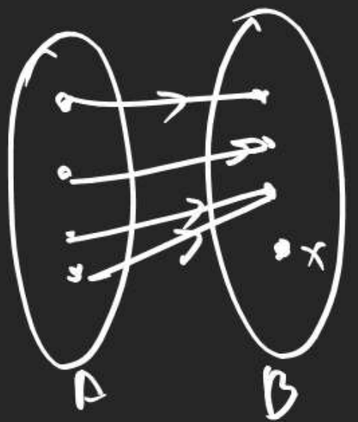
4 x 2

M2 1+ Onto

(D) Into fxn. Isthem

Into ← Range < Codomain

{B me Sab ko Teer nahi Lga}



M2 1+ Into

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RELATION FUNCTION

How to Check Kinds of fxn.

$f: A \to B$; $y = f(x)$

Raja.

M1 Using Mapping

In these fxn has following nature

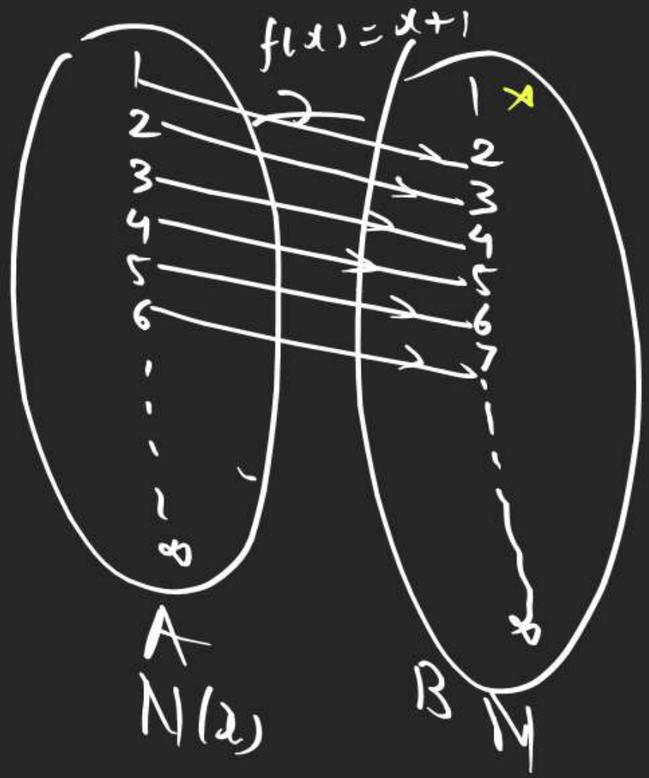
A) $f: N \to N$

B) $f: N \to I$

C) $f: I \to I$

D) $f: R \to R$ (difficult Qs)

Q $f: \underset{\text{Domi}}{N} \to \underset{\text{Cod}}{N}$ $f(x) = x+1$ Nature?



1-2-1

Into