

Q.1) Draw the graph of the function $f(x) = [x-1]$. Sol.1) $f(x) = [x-1]$ $e.g., when x = 1 then f(x) = [0] = 0 when x = 2 then f(x) = [1] = 1 Domain = R Range = Z Q.2) Let R be relation on N defined by R = \{(a,b): a = b \in N \text{ and } a = b^2\} Are the following true? (i) \{(a,a) \in R \text{ for all } a \in N, \text{ (ii) } (a,b) \in R \Rightarrow (b,a) \in R, \text{ (iii)} (a,b) \in R, (b,c) \in R \Rightarrow (a,c) \in R. Sol.2) R = \{(a,b): a = b^2\} (i) \geq eN But (2,2) \in R Since 2 \neq 2^2 : \text{ false} (iii) (4,2) \notin R as 4 = 2^2 but (2,4) \notin R Since 2 \neq 4^2 : \text{ false} (iii) (16,4) \in R \text{ and } (4,2) \in R as 16 = 4^4 \text{ and } 4 = 2^2 but (2,4) \notin R Since 16 \neq 2^2 : \text{ false} (iii) (16,4) \in R \text{ and } (4,2) \in R as 16 = 4^3 \text{ and } 4 = 2^2 but (2,4) \notin R Since 16 \neq 2^2 : \text{ false} (iii) (16,4) \in R \text{ and } (4,2) \in R as 16 = 4^3 \text{ and } 4 = 2^2 but (16,2) \notin R Sol.3) We have, R = \{(a,b): a = b \text{ is an integer}\} Q \to \text{ set of rational number} (1) \text{ for any } a \in Q, a = a = 0 \text{ which is an integer} \therefore (a,b) \in R \text{ and } (b,c) \in R \Rightarrow (a,c) \in R \Rightarrow a = b \text{ is an integer} \Rightarrow a = b \text{ in mich is also an integer} \Rightarrow (b,a) \in R (iii) \text{ it } (a,b) \in R \text{ and } (b,c) \in R \Rightarrow a = b \text{ in mich is also an integer} \Rightarrow (b,a) \in R (iii) \text{ it } (a,b) \in R \text{ and } (b,c) \in R \Rightarrow a = b \text{ in mich is also an integer} \Rightarrow (b,a) \in R (iiii) \text{ it } (a,b) \in R \text{ and } (b,c) \in R \Rightarrow a = b \text{ in mich is also an integer} \Rightarrow (b,a) \in R (iii) \text{ it } (a,b) \in R \text{ and } (b,c) \in R \Rightarrow a = b \text{ in mich is also an integer} \Rightarrow (b,a) \in R \text{ iiii} \text{ it } (a,b) \in R \text{ and } (b,c) \in R \Rightarrow a = b \text{ in mich is also an integer} \Rightarrow (b,a) \in R \text{ iiiii} \text{ it } (a,b) \in R \text{ and } (b,c) \in R \Rightarrow (a,c) \in R iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii$		RELATIONS & FUNCTIONS
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(i) for any $a \in Q, a-a=0$ which is an integer $ \begin{array}{c} \therefore (a,a) \in R \\ (ii) \ \ \text{let} \ (a,b) \in R \\ \Rightarrow a-b \ \text{is an integer} \\ \Rightarrow a-b=m \ \text{where} \ m \in Z \\ \Rightarrow b-a=-m \ \text{which is also an integer} \\ \Rightarrow (b,a) \in R \\ (iii) \ \ \text{let} \ (a,b) \in R \ \text{and} \ (b,c) \in R \\ \Rightarrow a-b=m \ \text{and} \ b-c=n \ (\text{where} \ m,n \in Z) \\ \text{Now,} \ (a-c)=(a-b)+(b-c) \\ =m+n \ \{\because \ \text{sum of two integers is also an integer}\} \\ =integer \\ \therefore \ (a,c) \in R \\ \hline Q.4) \qquad \qquad \ \text{If} \ A=(2,3) \ \text{and} \ B=(1,2,3). \ \text{Find the no. of relations.} \\ \hline \text{Sol.4}) \qquad A=(2,3) \ \text{and} \ B=(1,2,3) \\ \text{Here} \ m=2 \ \text{and} \ n=3 \\ \hline \end{array}$	Sol.3)	
$ \begin{array}{c} \therefore (a,a) \in R \\ (\text{ii}) \text{ let } (a,b) \in R \\ \Rightarrow a-b \text{ is an integer} \\ \Rightarrow a-b=m \text{ where } m \in Z \\ \Rightarrow b-a=-m \text{ which is also an integer} \\ \Rightarrow (b,a) \in R \\ (\text{iii}) \text{ let } (a,b) \in R \text{ and } (b,c) \in R \\ \Rightarrow a-b=m \text{ and } b-c=n \text{ (where } m,n \in Z) \\ \text{Now, } (a-c)=(a-b)+(b-c) \\ =m+n \{\because \text{ sum of two integers is also an integer}\} \\ =integer \\ \therefore (a,c) \in R \\ \hline \text{Q.4}) \qquad \text{If } A=(2,3) \text{ and } B=(1,2,3). \text{ Find the no. of relations.} \\ \text{Sol.4}) \qquad A=(2,3) \text{ and } B=(1,2,3) \\ \text{Here } m=2 \text{ and } n=3 \\ \end{array} $		
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Sol.4) $A = (2,3)$ and $B = (1,2,3)$ Here $m = 2$ and $n = 3$	Q.4)	
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= 2 ^{2×3}		

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	$= 2^6 = 64$ ans.
Q.5)	If $A \times A$ has 9 elements, among which two are $(1,0)$ and $(0,1)$. Find Set A & remaining
	elements of $A \times A$
Sol.5)	Given, $n(A \times A) = 9$
,	$\Rightarrow n(A) = 3$
	Now, $(-1,0)$ and $(0,1) \in A \times A$
	\Rightarrow $-1,0 \in A \text{ and } 0.1 \in A$
	\Rightarrow -1,0.1 \in A
	Also $n(A) = 3$
	$\therefore A = \{-1,0,1\}$
0.6	$A \times A = \{(-1, -1), (-1, 0), (-1, 1), (0, 1), (0, 0), (0, 1), (1, -1), (1, 0), (1, 1)\}$
Q.6)	$A \times A = \{(-1, -1), (-1, 0), (-1, 1), (0, 1), (0, 0), (0, 1), (1, -1), (1, 0), (1, 1)\}$ Find the domain of $f(x) = \frac{1}{\sqrt{x- x }}$
	$\sqrt{x- x }$
Sol.6)	We have, $f(x) = \frac{1}{\sqrt{x- x }}$ $ x = \begin{cases} x: x \ge 0 \\ -x: x < 0 \end{cases}$ $- x = \begin{cases} -x: x \ge 0 \\ x: x < 0 \end{cases}$ $x - x = \begin{cases} x - x: x \ge 0 \\ x + x: x < 0 \end{cases}$ $\Rightarrow x - x = \begin{cases} 0: x \ge 0 \\ 2x: x < 0 \end{cases} \dots \dots (1)$
	$\sqrt{x- x }$
	$ x = \begin{cases} x: x \ge 0 \\ x: x \ge 0 \end{cases}$
	(-x: x < 0)
	$ - x = \begin{cases} x \cdot x < 0 \end{cases}$
	$- x = \begin{cases} -x : x \ge 0 \\ x : x < 0 \end{cases}$ $x - x = \begin{cases} x - x : x \ge 0 \\ x + x : x < 0 \end{cases}$ $\Rightarrow x - x = \begin{cases} 0 : x \ge 0 \\ 2x : x < 0 \end{cases} \dots \dots (1)$ But we have $f(x) = 1$
	(0: x + x: x < 0)
	$\Rightarrow x - x = \begin{cases} 3x = 0 & \dots \\ 2x : x < 0 & \dots \end{cases} $ (1)
	But we have, $f(x) = \frac{1}{x}$
	But we have, $f(x) = \frac{1}{\sqrt{x- x }}$
	$ \therefore x - x > 0$
	From (1) $x - x = 0$ or $x - x $ is $-ye$
	$\therefore \frac{1}{\sqrt{x- x }}$ does not take real values for
	∴ Domain = Ø
0.7)	1
Q.7)	Find the domain of $f(x) = \frac{1}{\sqrt{x-[x]}}$
Sol.7)	f(x) will be defined when $x - [x] > 0$
	We know, $0 \le x - [x] < 1$ for all $x \in R$
	But $x - [x] = 0$ for all $x \in Z$
	$\therefore x - [x] > 0 \text{ when } x \in R - Z$
	\therefore Domain $R-Z$ ans.
Q.8)	find the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal
Sol.8)	we have, $f(x) = g(x)$
	$\Rightarrow 2x^2 - 1 = 1 - 3x$ $\Rightarrow 2x^2 + 3x - 2 = 0$
	$\Rightarrow 2x^2 + 3x - 2 = 0$ $\Rightarrow 2x^2 + 4x - x - 2 = 0$
	$ \Rightarrow 2x + 4x - x - 2 = 0 \Rightarrow 2x(x+2) - 1(x+2) = 0$
	$\Rightarrow (2x-1)(x+2) = 0$
	$\Rightarrow x = \frac{1}{2} \text{ or } x = -2$
	Domain all the values of x
	$\therefore Domain = \left\{\frac{1}{2}, -2\right\} ans.$
Q.9)	Redefine the function $f(x) = x-2 + 2+x $ where $-3 \le x \le 3$.
Sol.9)	Critical point of $ x-2 $ is 2
	Critical point of $ 2 + x $ is -2

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	First arrange in ascending order
	$\therefore f(x) = 2+x + x-2 $
	There will be 3 cases: (i) when $-3 \le x < -2$, (ii) when $-2 \le x < 2$, (iii) when $2 < x \le 3$
	$\left(-(2+x) - (x-2): -3 \le x < -2\right)$
	$(2+x) + (x-2): 2 < x \le 3$
	$\begin{pmatrix} -2x: -3 \le x < -2 \\ 1 \le x \le 2 \end{pmatrix}$
	$f(x) = \begin{cases} 4: (x-2): -2 \le x < 2 \text{ ans.} \end{cases}$
Q.10)	$(2x:(x-2):2 < x \le 3)$
	$f(x) = \begin{cases} -(2+x) - (x-2) : -3 \le x < -2 \\ (2+x) - (x-2) : -2 \le x < 2 \\ (2+x) + (x-2) : 2 < x \le 3 \end{cases}$ $f(x) = \begin{cases} -2x : -3 \le x < -2 \\ 4 : (x-2) : -2 \le x < 2 \text{ ans.} \\ 2x : (x-2) : 2 < x \le 3 \end{cases}$ Find the Range of $f(x) = \frac{1}{1-2\cos x}$
Sol.10)	we have, $-1 \le 2 \cos x \le 1$
	$-2 \le 2\cos x \le 2$
	$2 \ge -2\cos x \ge -2$
	$3 \ge 1 - 2\cos x \ge -1$
	$\Rightarrow \frac{1}{3} \leq \frac{1}{1 - 2\cos x} \leq \frac{1}{1}$
	$\Rightarrow \frac{1}{3} \le \frac{1}{1 - 2\cos x} \le \frac{-1}{1}$ $\Rightarrow \frac{1}{3} \le f(x) \le \frac{-1}{1}$
	$\Rightarrow f(x) \le -1 \text{ or } f(x) \ge \frac{1}{3}$
	$x \in [-00, -1] \cup \left[\frac{1}{3}, 00\right]$ ans.
	M. Silldiestoday.
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