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Department of Mathematics, 2021-2022

CLASS: XII | Chapter: 2 – Relations & Function | **25-04-2021**

	1-mark questions
Q.1.	Check whether the function $f: R \to R$ defined as $f(x)=x^3$ is one-one or not.
Q.2.	How many reflexive relations are possible in a set A whose $n(A)=3$.
Q.3.	A relation R in S= {1,2,3} is defined as R= {(1,1), (1,2), (2,2), (3,3)}. Which element(s) of relation R be removed to make R an equivalence relation?
Q.4.	A relation R in the set of real numbers R defined as R= $\{(a, b): \sqrt{a}=b\}$ is a function or not. Justify
Q.5.	An equivalence relation R in A divides it into equivalence classes A_1, A_2, A_3. What is the value of $A_1 \cup A_2 \cup A_3$ and $A_1 \cap A_2 \cap A_3$
Q.6.	If $f(x) = x + 7$ and $g(x) = x - 7$, $x \in R$, find (fog) (7)
Q.7.	If $f(x)$ is an invertible function, find the inverse of $f(x) = \frac{3x-2}{5}$.
Q.8.	What is the range of the function $f(x) = \frac{\lvert x-1 \rvert}{(x-1)}$?
	Descriptive questions
Q.9.	Check whether the relation R in the set Z of integers defined as R = $\{(a, b) : a+b$ is "divisible by 2"$\}$ is reflexive, symmetric or transitive. Write the equivalence class containing 0 i.e. [0].
Q.10	Show that the relation R in the set of real numbers, defined as $R = \{(a, b): a \leq b^2\}$ is neither reflexive, nor symmetric, nor transitive.
Q.11	Let Z be the set of all integers and R be the relation on Z defined as R = {(a, b) ; a, b $\in$ Z, and (a - b) is divisible by 5.} Prove that R is an equivalence relation.
Q12.	Show that the relation S in the set R of real numbers, defined as S = {(a, b): a, b $\in$ R and $a \leq b^3$} is neither reflexive, nor symmetric nor transitive.
Q13.	Consider $f: R \to [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left(\frac{\sqrt{y+6}-1}{3}\right)$.
Q14.	Consider $f: R_+ \to [4, \infty]$ given by $f(x) = x^2 + 4$. Show that f is invertible with the inverse (f^{-1}) of f given by $f^{-1}(y) = \sqrt{y-4}$, where R_+ is the set of all non-negative real numbers.

Q15.	Let $A = R - \{3\}$ and $B = R - \{1\}$. Consider the function $f: A \to B$ defined by $f(x) = \left(\frac{x-2}{x-3}\right)$. Show that f is one-one and onto and hence find f^{-1}.
Q16.	Show that $f : N \to N$, given by $f(x) = \begin{cases} x+1, & \text{if } x \text{ is odd} \\ x-1, & \text{if } x \text{ is even} \end{cases}$ is both one-one and onto.
Q17.	Let $f: W \to W$, be defined as $f(x) = x - 1$, if x is odd and $f(x) = x + 1$, if x is even. Show that f is invertible. Find the inverse of f, where W is the set of all whole numbers.
Q18.	Show that the relation R defind by (a, b) R (c, d) $\Rightarrow a + d = b + c$ on the $A \times A$, where $A = \{1, 2, 3, ..., 10\}$ is an equivalence relation. Hence write the equivalence class [(3, 4)]; a, b, c, d ϵ A.
Q19.	Let $f : N \to N$ be a function defined as $f(x) = 4x^2 + 12x + 15$. Show that $f : N \to S$ is invertible (where S is range of f). Find the inverse of f and hence find $f^{-1}(31)$ and $f^{-1}(87)$.
Q20.	If f, g : R $\to$ R be two functions defined as $f(x) = \lvert x \rvert + x$ and $g(x) = \lvert x \rvert - x$, $\forall x \in R$ Then find fog and gof. Hence find fog(–3), fog(5) and gof (–2).

Answers	**1**	one-one	**2**	2^6 reflexive relations	**3.**	(1,2)	**4**	$\sqrt{a}=b$ *is not a function.*
	5	$A_1 \cup A_2 \cup A_3 = A$ *and* $A_1 \cap A_2 \cap A_3 = \emptyset$	**6**	7	**7**	$f^{-1}(y) = (5y + 2)/3$	**8**	{ -1, 1}
	9	R is an equivalence relation in Z [0]={… -4, -2, 0, 2, 4, …}	**10**		**11**		**12**	
	13		**14**		**15**	$f^{-1}(y) =$ $(2-3y)/(1-y)$	**16**	
	17		**18**	[3, 4] = {(1,2),(2,3),(3,4),(4,5), (5,6),(6,7),(7,8),(8,9), (9,10)}	**19**	$f^{-1}(x) = \frac{-3+\sqrt{x-6}}{2}; x \geq 6$	**20**	