

Relations & Functions

TEST - 01

- Q01. If $f(x) = x^2 + 1$, $g(x) = \frac{1}{x-1}$ then, find $gof(5)$.
- Q02. Let $*$ be a binary operation defined by $x * y = 5x + 7y$. Find the value of $2 * 4$.
- Q03. Show that the relation R on \mathbb{R} defined as $R = \{(a, b) : a \leq b\}$ is reflexive and transitive but not symmetric.
OR Show that the relation R on the set \mathbb{R} of real numbers defined as $R = \{(a, b) : a \leq b^2\}$ is neither reflexive nor symmetric nor transitive.
- Q04. Let Z be the set of all integers and R be the relation on Z defined as $R = \{(a, b) : a, b \in Z \text{ and } (a - b) \text{ is divisible by } 5\}$. Prove that R is an equivalence relation.
- Q05. Is the binary operation defined on set \mathbb{N} , given by $a * b = \frac{a+b}{2}$ for all $a, b \in \mathbb{N}$, commutative? Is it associative?
- Q06. Consider the binary operation $*$ on the set $\{1, 2, 3, 4, 5\}$ defined by $a * b = \text{HCF of } a \text{ and } b$. Write the operation table of the operation $*$. Is $*$ commutative? Justify.
Also, compute: (a) $(2*3)*5$ (b) $(2*3)*(4*5)$.
- Q07. Consider $f : \mathbb{R}_+ \rightarrow [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible and is equal to $f^{-1}(y) = \frac{\sqrt{y+6} - 1}{3}$.
- Q08. Let $A = \mathbb{R} - \{2\}$ and $B = \mathbb{R} - \{1\}$, if $f : A \rightarrow B$ is a mapping defined by $f(x) = \frac{x-1}{x-2}$, show that f is bijective.
- Q09. Let $S = \{a, b, c\}$, find the total number of binary operations on S .
- Q10. What is the range of $f(x) = \frac{|x-1|}{x-1}$.

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Answers of Relations & Functions

TEST 01

- Q01. 1/25 Q02. 38 Q05. Commutative but not associative

Q06.

| | | | | | |
|---|---|---|---|---|---|
| * | 1 | 2 | 3 | 4 | 5 |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 1 | 2 | 1 | 2 | 1 |
| 3 | 1 | 1 | 3 | 1 | 1 |
| 4 | 1 | 2 | 1 | 4 | 1 |
| 5 | 1 | 1 | 1 | 1 | 5 |

$*$ is commutative because every row of the binary table is same as the corresponding column.

- (a) 1 (b) 1.

- Q09. $3^{3^2} = 3^9$ Q10. $\{-1, 1\}$.

Any query regarding any question in this test? Write to me on theopgupta@gmail.com

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