

# Relations and Functions

## 1. Relation and Its types

**Q1.** If  $R$  is a relation from a set  $A$  to a set  $B$  and  $S$  is a relation from  $B$  to a set  $C$ , then the relation  $SoR$

- (A) Is from  $A$  to  $C$
- (B) Is from  $C$  to  $A$
- (C) Does not exist
- (D) None of these

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Analyzing**

**Q2.** If  $R = \{ (a, b) : |a + b| = a + b \}$  is a relation defined on a set  $\{-1, 0, 1\}$ , then  $R$  is

- (A) Reflexive
- (B) Symmetric
- (C) Anti symmetric
- (D) Transitive

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Evaluating**

**Q3.** If  $R = \{ (a, b) : a + b = 4 \}$  is a relation on  $N$ , then  $R$  is

- (A) Reflexive
- (B) Symmetric
- (C) Antisymmetric
- (D) Transitive

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Evaluating**

**Q4.** If relation  $R$  is defined as :  $aRb$  if "a is the father of b". Then,  $R$  is

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q5.** If two sets  $A$  and  $B$  are having 99 elements in common, then the number of elements common to each of the sets  $A \times B$  and  $B \times A$  are

- (A)  $2^{99}$
- (B) 18
- (C) 100
- (D)  $99^2$

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Evaluating**

**Q6.** In a set of ants in a locality, two ants are said to be related iff they walk on a same straight line, then the relation is

- (A) Reflexive and symmetric
- (B) Symmetric and transitive
- (C) Reflexive and transitive
- (D) Equivalence

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q7.** In a set of teachers of a school, two teachers are said to be related if they "teach the same subject", then the relation is

- (A) Reflexive and symmetric
- (B) Symmetric and transitive
- (C) Reflexive and transitive
- (D) None of these

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Evaluating**

**Q8.** In order that a relation R defined on a non-empty set A is an equivalence relation, it is sufficient, if R

- (A) Is reflexive
- (B) Is symmetric
- (C) Is transitive
- (D) Possesses all the above three properties

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q9.** In the set  $A = \{1, 2, 3, 4, 5\}$ , a relation R is defined by  $R = \{(x, y) : x, y \in A \text{ and } x < y\}$ . Then, R is

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Analyzing**

**Q10.** Let  $A = \{1, 2, 3, 4\}$ , and let  $R = \{(2, 2), (3, 3), (4, 4), (1, 2)\}$  be a relation on A. Then, R is

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q11.** Let A be a set of compartments in a train. Then the relation R defined on A as  $aRb$  iff "a and b have the link between them", then which of the following is true for R?

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) Equivalence

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q12.** Let A be the non-void set of the children in a family. The relation 'x is a brother of y' on A is

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Analyzing**

**Q13.** Let A be the set of all animals. A relation R is defined as "aRb iff a and b are in different zoological parks". Then R is

- (A) Only reflexive
- (B) Only symmetric
- (C) Only transitive
- (D) Equivalence

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q14.** Let A be the set of all students in a school. A relation R is defined on A as follows:  
"aRb iff a and b have the same teacher"

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) Equivalence

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q15.** Let L be the set of all straight lines in the Euclidean plane. Two lines  $l_1$  and  $l_2$  are said to be related by the relation R iff  $l_1$  is parallel to  $l_2$ . Then, the relation R is not

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Evaluating**

**Q16.** Let n be a fixed positive integer. Define a relation R on the set Z of integers by,  $aRb \Leftrightarrow n \mid a-b$ . Then, R is not

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q17.** Let  $P = \{(x, y) \mid x^2 + y^2 = 1, x, y \in \mathbb{R}\}$ . Then,  $P$  is

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) Antisymmetric

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q18.** Let  $R = \{(a, a)\}$  be a relation on a set  $A$ . Then,  $R$  is

- (A) Symmetric
- (B) Antisymmetric
- (C) Symmetric and antisymmetric
- (D) Neither symmetric nor antisymmetric

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q19.** Let  $R$  and  $S$  be two equivalence relations on a set  $A$ . Then,

- (A)  $R \cup S$  is an equivalence relation on  $A$
- (B)  $R \cap S$  is an equivalence relation on  $A$
- (C)  $R - S$  is an equivalence relation on  $A$
- (D) None of these

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q20.** Let  $R$  and  $S$  be two relations on a set  $A$ . Then, which one of the following is not true?

- (A)  $R$  and  $S$  are transitive, then  $R \cup S$  is also transitive
- (B)  $R$  and  $S$  are transitive, then  $R \cap S$  is also transitive
- (C)  $R$  and  $S$  are reflexive, then  $R \cap S$  is also reflexive
- (D)  $R$  and  $S$  are symmetric, then  $R \cup S$  is also symmetric

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Analyzing**

**Q21.** Let  $R$  be a reflexive relation on a set  $A$  and  $I$  be the identity relation on  $A$ . Then,

- (A)  $R \subset I$
- (B)  $I \subset R$
- (C)  $R = I$
- (D) None of these

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q22.** Let  $R$  be a relation defined on  $S$ , the set of squares on a chess board such that  $xRy$  iff  $x$  and  $y$  share a common side. Then, which of the following is false for  $R$ ?

- (A) Reflexive
- (B) Symmetric
- (C) Transitive

(D) All the above

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Analyzing**

**Q23.** Let  $R$  be a relation on the set  $N$  of natural numbers defined by  $nRm \Leftrightarrow n$  is a factor of  $m$  (i.e.  $n \mid m$ ). Then,  $R$  is

- (A) Reflexive and symmetric
- (B) Transitive and symmetric
- (C) Equivalence
- (D) Reflexive, transitive but not symmetric

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q24.** Let  $R$  be an equivalence relation on a finite set  $A$  having  $n$  elements. Then, the number of ordered pairs in  $R$  is

- (A) Less than  $n$
- (B) Greater than or equal to  $n$
- (C) Less than or equal to  $n$
- (D) None of these

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q25.** Let  $R_1$  be a relation defined by  $R_1 = \{(a, b) \mid a \geq b, a, b \in R\}$ . Then,  $R_1$  is

- (A) An equivalence relation on  $R$
- (B) Reflexive, transitive but not symmetric
- (C) Symmetric, transitive but not reflexive
- (D) Neither transitive nor reflexive but symmetric

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q26.** Let  $X = \{1, 2, 3, 4, 5\}$  and  $Y = \{1, 3, 5, 7, 9\}$ . Which of the following is/are not relations from  $X$  to  $Y$ ?

- (A)  $R_1 = \{(x, y) \mid y = 2 + x, x \in X, y \in Y\}$
- (B)  $R_2 = \{(1, 1), (2, 1), (3, 3), (4, 3), (5, 5)\}$
- (C)  $R_3 = \{(1, 1), (1, 3), (3, 5), (3, 7), (5, 7)\}$
- (D)  $R_1 = \{(1, 3), (2, 5), (2, 4), (7, 9)\}$

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Evaluating**

**Q27.** Let  $X$  be a family of sets and  $R$  be a relation on  $X$  defined by 'A is disjoint from B'. Then,  $R$  is

- (A) Reflexive
- (B) Symmetric
- (C) Antisymmetric
- (D) Transitive

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q28.** On the set of human beings a relation R is defined as follows: "aRb iff a and b have the same brother". Then R is

- (A) Only reflexive
- (B) Only symmetric
- (C) Only transitive
- (D) Equivalence

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q29.** Set builder form of the relation  $R = \{(-2, -7), (-1, -4), (0, -1), (1, 2), (2, 5)\}$  is

- (A)  $\{(a, b) : b = 2a - 3; a, b, \in \mathbb{Z}\}$
- (B)  $\{(x, y) : y = 3x - 1; x, y \in \mathbb{Z}\}$
- (C)  $\{(a, b) : b = 3a - 1; a, b \in \mathbb{N}\}$
- (D)  $\{(u, u) : u = 3u - 1; -2 \leq u < 3 \text{ and } u \in \mathbb{Z}\}$

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Evaluating**

**Q30.** The relation "is a factor of" on the set N of all natural numbers is not

- (A) Reflexive
- (B) Symmetric
- (C) Antisymmetric
- (D) Transitive

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q31.** The relation R defined in N as  $a R b \Leftrightarrow b$  is divisible by a is

- (A) Reflexive but not symmetric
- (B) Symmetric but not transitive
- (C) Symmetric and transitive
- (D) None of these

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Analyzing**

**Q32.** The relation  $R = \{(1, 3), (3, 5)\}$  is defined on the set with minimum number of elements of natural numbers. The minimum number of elements to be included in R so that R is an equivalence relation, is

- (A) 5
- (B) 6
- (C) 7
- (D) 8

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Analyzing**

**Q33.** The void relation on a set A is

- (A) Reflexive
- (B) Symmetric and transitive
- (C) Reflexive and symmetric

(D) Reflexive and transitive

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q34.** Two points P and Q in a plane are related if  $OP = OQ$ , where O is a fixed point. This relation is

(A) Partial order relation

(B) Equivalence relation

(C) Reflexive but not symmetric

(D) Reflexive but not transitive

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Analyzing**

**Q35.** Which of the following is an equivalence relation?

(A) Is father of

(B) Is less than

(C) Is congruent to

(D) Is an uncle of

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Analyzing**

**Q36.** Which of the following relations is symmetric and transitive but not reflexive for the set  $I = \{4, 5\}$ ?

(A)  $R = \{(4, 4), (5, 4), (5, 5)\}$

(B)  $R = \{(4, 4), (5, 5)\}$

(C)  $R = \{(4, 5), (5, 4)\}$

(D)  $R = \{(4, 5), (5, 4), (4, 4)\}$

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Analyzing**

**Q37.** Which of the following relations is transitive but not reflexive for the set  $S = \{3, 4, 6\}$ ?

(A)  $R = \{(3, 4), (4, 6), (3, 6)\}$

(B)  $R = \{(1, 2), (1, 3), (1, 4)\}$

(C)  $R = \{(3, 3), (4, 4), (6, 6)\}$

(D)  $R = \{(3, 4), (4, 3)\}$

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Remembering**

**Q38.** Which of the following statements is not correct for the relation R defined by aRb, if and only, if b lives within one kilometre from a?

(A) R is reflexive

(B) R is symmetric

(C) R is anti-symmetric

(D) None of these

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Analyzing**

**Q39.** Which of these is not a type of relation?

(A) Reflexive

- (B) Surjective
- (C) Symmetric
- (D) Transitive

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Remembering**

**Q40.** Which one of the following relations on  $R$  is an equivalence relation?

- (A)  $a R_1 b \Leftrightarrow |a| = |b|$
- (B)  $a R_2 b \Leftrightarrow a \geq b$
- (C)  $a R_3 b \Leftrightarrow a$  divides  $b$
- (D)  $a R_4 b \Leftrightarrow a < b$

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Analyzing**

**Q41.** Given set  $A = \{1, 2, 3\}$  and a relation  $R = \{(1, 2), (2, 1)\}$ , the relation  $R$  will be

- (A) Reflexive if  $(1, 1)$  is added
- (B) Symmetric if  $(2, 3)$  is added
- (C) Transitive if  $(1, 1)$  is added
- (D) Symmetric if  $(3, 2)$  is added

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Evaluating**

**Q42.** Let  $L$  denote the set of all straight lines in a plane. Let a relation  $R$  be defined by  $\alpha R \beta \Leftrightarrow \alpha \perp \beta, \alpha, \beta \in L$ . Then  $R$  is

- (A) Reflexive
- (B) Symmetric
- (C) Transitive
- (D) None of these

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Applying**

**Q43.** The relation  $R$  in the set Integers given by  $R = \{(a, b) : a - b \text{ is divisible by } 3\}$  is

- (A) Reflexive
- (B) Reflexive but not symmetric
- (C) Not symmetric and transitive
- (D) Equivalence relation

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Understanding**

**Q44.** Which of the following relations is reflexive but not transitive for the set  $T = \{7, 8, 9\}$ ?

- (A)  $R = \{(7, 7), (8, 8), (9, 9)\}$
- (B)  $R = \{(7, 8), (8, 7), (8, 9)\}$
- (C)  $R = \{0\}$
- (D)  $R = \{(7, 8), (8, 8), (8, 9)\}$

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Creating**



**Q45.** Which of the following relations is symmetric but neither reflexive nor transitive for a set  $A = \{1, 2, 3\}$ .

- (A)  $R = \{(1, 2), (1, 3), (1, 4)\}$
- (B)  $R = \{(1, 2), (2, 1)\}$
- (C)  $R = \{(1, 1), (2, 2), (3, 3)\}$
- (D)  $R = \{(1, 1), (1, 2), (2, 3)\}$

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Creating**

**Q46.** Let  $L$  be a set of all lines in a  $XY$  plane and  $R$  be a relation in  $L$  defined as  $R = \{(L_1, L_2) : L_1 \text{ is parallel to } L_2\}$ . What is the type of given relation?

- (A) Reflexive relation
- (B) Transitive relation
- (C) Symmetric relation
- (D) Equivalence relation

Correct Answer: **(D)**

Level: **Difficult**

Tagging: **Understanding**

**Q47.** Let  $R$  be a relation in the set  $N$  given by  $R = \{(a, b) : a + b = 5, b > 1\}$ . Which of the following will satisfy the given relation?

- (A)  $(2, 3) \in R$
- (B)  $(4, 2) \in R$
- (C)  $(2, 1) \in R$
- (D)  $(5, 0) \in R$

Correct Answer: **(A)**

Level: **Difficult**

Tagging: **Analyzing**

## 2. Functions and Its Classification

**Q48.** The domain of definition of  $f(x) = \log_{100} x \left( \frac{2 \log_{10} x + 1}{-x} \right)$ , is

- (A)  $(0, 10^{-2}) \cup (10^{-2}, 10^{-1/2})$
- (B)  $(0, 10^{-1/2})$
- (C)  $(0, 10^{-1})$
- (D) None of these

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Evaluating**

**Q49.** A function  $f(x)$  is defined as  $f(x) = |x + 3|$ . For what values of  $x$  is  $f(x)$  equal to 0?

- (A)  $x = -3$
- (B)  $x = 3$
- (C)  $x = -6$  or  $x = 0$
- (D)  $x = -3$  or  $x = 0$

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Understanding**

**Q50.** A function that assigns each real number to its cube is an example of a:

- (A) Linear function
- (B) Quadratic function
- (C) Cubic function
- (D) Exponential function

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q51.** A function that is both one-to-one and onto is called:

- (A) Linear function
- (B) Quadratic function
- (C) Bijective function
- (D) Exponential function

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q52.** Consider the set A containing n elements. The total number of injective functions from A onto itself is :

- (A) 1
- (B) n
- (C)  $2n$
- (D)  $n!$

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Remembering**

**Q53.** If a function is defined as  $f(x) = x^2$ , what is the value of  $f(3)$ ?

- (A) 6
- (B) 9
- (C) 27
- (D) 81

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Understanding**

**Q54.** If a function maps every element of its domain to a single, specific element in its co-domain, it is:

- (A) One-to-many function
- (B) Many-to-one function
- (C) One-to-one function
- (D) Onto function

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q55.** If the function  $f : \mathbb{N} \rightarrow \mathbb{N}$  be defined by  $f(n) = 3n + 4, \forall n \in \mathbb{N}$ , then f is:

- (A) Surjective.
- (B) Injective.
- (C) Bijective.

(D) None of these.

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Remembering**

**Q56.** Let the function  $f: \mathbb{N} \rightarrow \mathbb{N}$  be defined by  $f(x) = 2x$ . The function  $f$  is a:

- (A) Surjection.
- (B) One to One.
- (C) Many to One.
- (D) None of these

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Understanding**

**Q57.** The function  $f(x) = e^x$  is an example of a:

- (A) Linear function
- (B) Quadratic function
- (C) Exponential function
- (D) Trigonometric function

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q58.** The function  $f(x) = \sin(x)$  takes its values in the range:

- (A)  $[-1, 1]$
- (B)  $[0, 1]$
- (C)  $(-\infty, \infty)$
- (D)  $[1, \infty)$

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Understanding**

**Q59.** The number of one-to-one functions from  $\{1, 2, 3\}$  to  $\{1, 2, 3, 4, 5\}$  is

- (A) 125
- (B) 243
- (C) 10
- (D) 60

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Evaluating**

**Q60.** What is the range of the function  $f(x) = |x|$ ?

- (A) All real numbers greater than or equal to 0
- (B) All real numbers
- (C) All real numbers greater than 0
- (D) All real numbers less than 0

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Understanding**

**Q61.** Which of the following is a valid definition of a function?

- (A) A relation where each element in the domain is associated with multiple elements in the co-domain.
- (B) A relation where each element in the co-domain is associated with exactly one element in the domain.

- (C) A relation where each element in the domain is associated with exactly one element in the co-domain.
- (D) A relation where there is no connection between elements in the domain and co-domain.

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q62.** Which type of function has a constant rate of change?

- (A) Linear function
- (B) Quadratic function
- (C) Cubic function
- (D) Exponential function

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Understanding**

**Q63.** Consider the following statements:

1. A function  $f : Z \rightarrow Z$ , defined by  $f(x) = x + 1$ , is one-one as well as onto.
2. A function  $f : N \rightarrow N$ , defined by  $f(x) = x + 1$ , is one-one but not onto.

Which of the above statements is/are correct?

- (A) 1 only
- (B) 2 only
- (C) Both 1 and 2
- (D) Neither 1 nor 2

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Analyzing**

**Q64.** Consider the function  $f : R \rightarrow \{0, 1\}$  such that  $f(x) = \{1 \text{ if } x \text{ is rational and } 0 \text{ if } x \text{ is irrational}\}$ . Which one of the following is correct?

- (A) The function is one-one into
- (B) The function is many-one into
- (C) The function is one-one onto
- (D) The function is many-one onto

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Evaluating**

**Q65.** Find out if function  $f : N \rightarrow N$ , given by  $f(x) = 4x$ , is one - one but not onto.

- (A) False
- (B) True
- (C) Can't say
- (D) None of the above

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Understanding**

**Q66.** Let  $N$  be the set of natural numbers and  $f : N \rightarrow N$  be a function given by  $f(x) = x + 1 \forall x \in N$ . Which one of the following is correct?

- (A)  $f$  is one - one and onto
- (B)  $f$  is one - one but not onto
- (C)  $f$  is only onto

(D)  $f$  is neither one - one nor onto

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Understanding**

**Q67.** Let  $P = \{10, 20, 30\}$  and  $Q = \{5, 10, 15, 20\}$ . Which one of the following functions is one - one and not onto?

(A)  $f = \{(10, 5), (10, 10), (10, 15), (10, 20)\}$

(B)  $f = \{(10, 5), (20, 10), (30, 15)\}$

(C)  $f = \{(20, 5), (20, 10), (30, 10)\}$

(D)  $f = \{(10, 5), (10, 10), (20, 15), (30, 20)\}$

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Applying**

**Q68.** Let the function ' $f$ ' be defined by  $f(x) = 5x^2 + 2$ ,  $x \in \mathbb{R}$ , then ' $f$ ' is

(A) onto function

(B) one-one, onto function

(C) one-one, into function

(D) many-one into function

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Evaluating**

### **3. Composite of Functions and Invertible Function**

**Q69.** An element is said to be invertible only if there is an identity element in that binary operation.

(A) True

(B) False

(C) undefined

(D) None

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Remembering**

**Q70.** An invertible function is one that:

(A) Has the same output for multiple inputs.

(B) Has a horizontal asymptote.

(C) Has an inverse that is also a function.

(D) Is a polynomial function.

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q71.** For a function to have an inverse, it must be:

(A) Continuous

(B) Discontinuous

(C) Bijective

(D) Non-monotonic

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q72.** If a function  $f(x)$  has an inverse  $f^{-1}(x)$ , what is true about the composition of  $f$  and its inverse?

- (A)  $f(f^{-1}(x)) = f^{-1}(f(x)) = x$
- (B)  $f(f^{-1}(x)) = f(x)$
- (C)  $f(f^{-1}(x)) = x$
- (D)  $f^{-1}(f(x)) = 1$

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Understanding**

**Q73.** If a function  $f(x)$  is such that  $f(f^{-1}(x)) = x$  for all  $x$  in the domain of  $f^{-1}$ , then:

- (A)  $f(x)$  is the inverse of  $f^{-1}(x)$ .
- (B)  $f^{-1}(x)$  is the inverse of  $f(x)$ .
- (C) Both  $f(x)$  and  $f^{-1}(x)$  are identity functions.
- (D) The composition  $f \circ f^{-1}$  is not defined.

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q74.** If function  $f(x)$  is defined as  $f(x) = 2x + 3$  and function  $g(x)$  is defined as  $g(x) = x^2$ , what is the composite function  $(f \circ g)(x)$ ?

- (A)  $2x^2 + 3$
- (B)  $4x^2 + 3$
- (C)  $2x^2 + 6$
- (D)  $4x^2 + 9$

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Understanding**

**Q75.** If function  $f(x)$  is invertible, what can you say about its domain and range?

- (A) The domain and range of  $f(x)$  are both restricted.
- (B) The domain and range of  $f(x)$  are both unrestricted.
- (C) The domain of  $f(x)$  is unrestricted, but the range is restricted.
- (D) The domain of  $f(x)$  is restricted, but the range is unrestricted.

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Understanding**

**Q76.** If functions  $f(x)$  and  $g(x)$  are such that  $f(g(x)) = x$  for all  $x$  in the domain of  $g$ , then:

- (A)  $f(x)$  is the inverse of  $g(x)$ .
- (B)  $g(x)$  is the inverse of  $f(x)$ .
- (C)  $f(x)$  and  $g(x)$  are both invertible.
- (D)  $f(x)$  and  $g(x)$  are identical.

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Understanding**

**Q77.** Let  $f: A \rightarrow B$  and  $g: B \rightarrow C$  be one - one functions. Then,  $g \circ f: A \rightarrow C$  is

- (A) One-one
- (B) Does not exist
- (C) Not onto
- (D) Onto

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Creating**

**Q78.** Let  $R$  be a reflexive relation on a finite set  $A$  having  $n$  elements, and let there be  $m$  ordered pairs in  $R$ . Then,

- (A)  $m \geq n$
- (B)  $m \leq n$
- (C)  $m = n$
- (D) None of these

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Evaluating**

**Q79.** The inverse of the function  $f(x) = 3x + 2$  is given by:

- (A)  $f^{-1}(x) = 3x + 2$
- (B)  $f^{-1}(x) = (x - 2) / 3$
- (C)  $f^{-1}(x) = 2x + 3$
- (D)  $f^{-1}(x) = (x + 2) / 3$

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Understanding**

**Q80.**  $f : \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x) = x^2 - 2x + 1$ . Find  $f[f(x)]$

- (A)  $x^4 + 4x^3 - 4x^2$
- (B)  $x^4 - 4x^3 + 4x^2$
- (C)  $x^4 + 4x^3 + 4x^2$
- (D)  $x^4 - 4x^3 - 4x^2$

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Applying**

**Q81.** If  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = \cos x$  and  $g(x) = 7x^3 + 6$  then  $f \circ g(x)$  is

- (A)  $\cos(7x^3 + 6)$
- (B)  $\cos x$
- (C)  $\cos(x^3)$
- (D)  $\cos(x^3 + 6)$

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Applying**

**Q82.** If  $f(x) = \tan^{-1} x$  and  $g(x) = \tan(x)$ , then  $(g \circ f)(x) =$

- (A)  $\tan^{-1} x \tan(x)$
- (B)  $\tan^{-1} x \cot(x)$
- (C)  $x$
- (D)  $\tan^{-1} x \sin(x)$

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Applying**

**Q83.** Let  $f : \mathbb{Q} \rightarrow \mathbb{Q}$  be a function given by  $f(x) = x^2$ , then  $f^{-1}(9) =$

- (A)  $\{3\}$
- (B)  $f$
- (C)  $\{-3, 3\}$
- (D)  $\{-3\}$

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Applying**

**Q84.** Let  $M = \{7, 8, 9\}$ . Determine which of the following functions is invertible for  $f: M \rightarrow M$ .

- (A)  $f = \{(7, 7), (8, 8), (9, 9)\}$
- (B)  $f = \{(7, 8), (7, 9), (8, 9)\}$
- (C)  $f = \{(8, 8), (8, 7), (9, 8)\}$
- (D)  $f = \{(9, 7), (9, 8), (9, 9)\}$

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Creating**

**Q85.** If  $f: \mathbb{R} \rightarrow \mathbb{R}$ ,  $g(x) = 3x^2 + 7$  and  $f(x) = \sqrt{x}$ , then  $\text{gof}(x)$  is equal to \_\_\_\_\_

- (A)  $3x - 7$
- (B)  $3x - 9$
- (C)  $3x + 7$
- (D)  $3x - 8$

Correct Answer: **(C)**

Level: **Difficult**

Tagging: **Applying**

**Q86.** If  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = 2x + 3$  and  $g(x) = x^2 + 7$ , then the value of  $x$  for which  $f(g(x)) = 25$  is

- (A)  $\pm 3$
- (B)  $\pm 1$
- (C)  $\pm 4$
- (D)  $\pm 2$

Correct Answer: **(D)**

Level: **Difficult**

Tagging: **Applying**

**Q87.** If  $f: \mathbb{N} \rightarrow \mathbb{N}$ ,  $g: \mathbb{N} \rightarrow \mathbb{N}$  and  $h: \mathbb{N} \rightarrow \mathbb{R}$  is defined  $f(x) = 3x - 5$ ,  $g(y) = 6y^2$  and  $h(z) = \tan(z)$  find  $h \circ (\text{gof})$

- (A)  $\tan(6(3x - 5))$
- (B)  $\tan(6(3x - 5)^2)$
- (C)  $\tan(3x - 5)$
- (D)  $6 \tan(3x - 5)^2$

Correct Answer: **(B)**

Level: **Difficult**

Tagging: **Applying**

**Q88.** Let  $f = \{(1, 3), (2, 1), (3, 2)\}$  and  $g = \{(1, 2), (2, 3), (3, 1)\}$ . What is  $\text{gof}(2)$ ?

- (A) 3
- (B) Does not exist
- (C) 2
- (D) 1



Correct Answer: **(C)**

Level: **Difficult**

Tagging: **Applying**

#### 4. Binary Operations

**Q89.** In a group, the property where for any elements  $a$  and  $b$ ,  $(a * b^{-1} = b^{-1} * a^{-1})$ , is called:

- (A) Associative property
- (B) Commutative property
- (C) Inverse property
- (D) Distributive property

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q90.** In the operation of matrix multiplication, what is the identity element?

- (A) A matrix of all ones.
- (B) A matrix of all zeros.
- (C) The zero matrix.
- (D) The identity matrix.

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Understanding**

**Q91.** Let '\*' be defined on the set  $N$ . Which of the following are both commutative and associative?

- (A)  $a*b = a+b$
- (B)  $a*b = a-b$
- (C)  $a*b = ab^2$
- (D)  $a*b = ab$

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Remembering**

**Q92.** The operation of subtraction is a binary operation on which of the following sets?

- (A) Natural numbers
- (B) Integers
- (C) Rational numbers
- (D) All of these

Correct Answer: **(D)**

Level: **Easy**

Tagging: **Understanding**

**Q93.** The operation of taking the maximum of two real numbers is a binary operation that is:

- (A) Associative and commutative.
- (B) Associative but not commutative.
- (C) Commutative but not associative.
- (D) Neither associative nor commutative.

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q94.** What is a binary operation?

- (A) An operation involving three operands.
- (B) An operation that works only with binary numbers.

(C) An operation that combines two elements to produce a third element.

(D) An operation that works exclusively with addition and subtraction.

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q95.** Which of the following binary operations is not associative?

(A) Matrix addition

(B) Matrix multiplication

(C) Integer addition

(D) Exponentiation

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Understanding**

**Q96.** Which of the following is a binary operation on the set of real numbers?

(A) Square root

(B) Cubing

(C) Division

(D) Absolute value

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q97.** Which of the following is not a type of binary operation?

(A) Transitive

(B) Commutative

(C) Associative

(D) Distributive

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Remembering**

**Q98.** Which property states that for elements  $a$  and  $b$  under a binary operation,  $a * b = b * a$ ?

(A) Distributive property

(B) Associative property

(C) Commutative property

(D) Closure property

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Understanding**

**Q99.** Let ' $\&$ ' be a binary operation defined on the set  $N$ . Which of the following definitions is commutative but not associative?

(A)  $a \& b = a - b$

(B)  $a \& b = a + b$

(C)  $a \& b = ab - 8$

(D)  $a \& b = ab$

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Analyzing**

**Q100.** Let ' $*$ ' be a binary operation defined by  $a * b = 4ab$ . Find  $(a * b) * a$ .

- (A)  $4a^2 b$
- (B)  $16a^2 b$
- (C)  $16ab^2$
- (D)  $4ab^2$

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Applying**

**Q101.** Let '\*' be a binary operation defined by  $a*b=3a^b+5$ . Find  $8*3$ .

- (A) 1547
- (B) 1458
- (C) 1448
- (D) 1541

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Applying**

**Q102.** Let '\*' be a binary operation on N defined by  $a*b=a-b+ab^2$ , then find  $4*5$ .

- (A) 9
- (B) 88
- (C) 98
- (D) 99

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Applying**

**Q103.** Let a binary operation '\*' be defined on a set A. The operation will be commutative if \_\_\_\_\_

- (A)  $a*b = b*a$
- (B)  $(a*b)*c = a*(b*c)$
- (C)  $(b \circ c)*a = (b*a) \circ (c*a)$
- (D)  $a*b = a$

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Remembering**

**Q104.** Let  $a*b = 6a^4-9b^4$  be a binary operation on R, then \* is commutative.

- (A) True
- (B) False
- (C) Partially True
- (D) Can't Say

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Understanding**

**Q105.** Let '\*' and '^' be two binary operations such that  $a*b=a^2 b$  and  $a \wedge b = 2a+b$ . Find  $(2*3) \wedge (6*7)$ .

- (A) 256
- (B) 286
- (C) 276
- (D) 275

Correct Answer: **(C)**

Level: **Difficult**

Tagging: **Applying**