

Relations and Functions — Assignment 1

Class 11 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
 (2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
 (3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Ordered Pairs and Cartesian Product

MCQ Questions (choose the correct option)

- If $A = \{1, 2\}$ and $B = \{3, 4\}$, then $A \times B$ has
 - 4 elements
 - 2 elements
 - 3 elements
 - 6 elements
- The Cartesian product $A \times B$ is the set of all
 - ordered pairs (a, b) with $a \in A, b \in B$
 - subsets of $A * B$
 - elements common to A and B
 - ordered pairs (b, a) with $a \in A$
- If $n(A) = 3$ and $n(B) = 2$, then $n(A \times B)$ is
 - 6
 - 5
 - 9
 - 4
- If $A = B$, then $A \times B = B \times A$
 - only if A is a finite set
 - only if $A = \emptyset$
 - never
 - always, when $A = B$

1 Mark Questions

- Define the Cartesian product of two sets A and B .
- If $A = \{1, 2\}$ and $B = \{3, 4\}$, find $A \times B$.
- If $n(A) = 2$ and $n(B) = 3$, find $n(A \times B)$.

2 Mark Questions

- If $A = \{1, 2, 3\}$ and $B = \{4, 5\}$, find $A \times B$ and $B \times A$.
- If $A \times B = \{(a, 1), (a, 2), (b, 1), (b, 2)\}$, find A and B .

3 Mark Questions

- If $A = \{1, 2\}$, $B = \{3, 4\}$ and $C = \{5\}$, verify that $A \times (B * C) = (A \times B) * (A \times C)$.
- Prove that if $A \cap B = \emptyset$ then $A \times C \cap B \times C = \emptyset$ for any set C .

Relations

MCQ Questions (choose the correct option)

1. A relation from A to B is a subset of
 - (A) $A \times B$
 - (B) $A * B$
 - (C) $A \cap B$
 - (D) $B \times A$
2. The domain of a relation R from A to B is the set of
 - (A) all first elements of the ordered pairs in R
 - (B) all second elements of the ordered pairs in R
 - (C) all elements of A
 - (D) all elements of B
3. The range of a relation R is the set of
 - (A) all second elements of the ordered pairs in R
 - (B) all first elements of the ordered pairs in R
 - (C) all elements of A
 - (D) all elements of B
4. If $R = \{(1, 2), (3, 4), (5, 6)\}$, then the domain of R is
 - (A) $\{1, 3, 5\}$
 - (B) $\{2, 4, 6\}$
 - (C) $\{1, 2, 3\}$
 - (D) $\{4, 5, 6\}$

1 Mark Questions

1. Define a relation from A to B.
2. Define the domain and range of a relation.
3. Find the domain of $R = \{(1, 2), (3, 4), (5, 6)\}$.

2 Mark Questions

1. If $A = \{1, 2, 3\}$ and $B = \{4, 5\}$, write two relations from A to B.
2. For $R = \{(1, 1), (2, 4), (3, 9)\}$, find the domain and range.

3 Mark Questions

1. If $A = \{1, 2, 3, 4, 5\}$, define $R = \{(a, b) : a + b = 6\}$. Write R in roster form and find its domain and range.
2. Define a relation and explain the domain, codomain and range of a relation with an example.

Functions and Their Graphs

MCQ Questions (choose the correct option)

1. A relation f from A to B is a function if
 - (A) every element of A has exactly one image in B
 - (B) every element of B has one preimage
 - (C) f is a subset of A
 - (D) every element of A has two images
2. The set of all first elements of a function f is called its

- (A) domain
 - (B) range
 - (C) codomain
 - (D) graph
3. The graph of the identity function $f(x) = x$ is
- (A) a straight line through the origin
 - (B) a parabola
 - (C) a horizontal line
 - (D) a circle
4. For the function $f(x) = x^2$, the range for $x \in \mathbb{R}$ is
- (A) $[0, \infty)$
 - (B) $(-\infty, \infty)$
 - (C) $\mathbb{R}$
 - (D) $(0, 1)$

1 Mark Questions

1. Define a function from A to B.
2. Find $f(2)$ if $f(x) = 3x + 1$.
3. Is the identity function $f(x) = x$ a linear function?

2 Mark Questions

1. If $f(x) = 2x + 3$, find $f(0)$, $f(1)$ and $f(-1)$.
2. Draw the graph of $f(x) = x^2$ for $x \in \mathbb{R}$ and state its range.

3 Mark Questions

1. Define a function and explain the domain, codomain and range with an example, distinguishing a function from a general relation.
2. If $f(x) = x^2 - 3x + 2$, find $f(0)$, $f(1)$, $f(2)$ and $f(-1)$.

Types of Functions

MCQ Questions (choose the correct option)

1. The function $f(x) = x + 1$ is
 - (A) injective
 - (B) constant
 - (C) modulus
 - (D) identity
2. The function $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = x^2$ is
 - (A) not injective
 - (B) injective
 - (C) bijective
 - (D) constant
3. A function that is both injective and surjective is called
 - (A) bijective
 - (B) injective only

- (C) surjective only
 - (D) constant
4. The function $f(x) = |x|$ is called the
- (A) modulus function
 - (B) signum function
 - (C) identity function
 - (D) linear function

1 Mark Questions

1. Define an injective function.
2. Define a bijective function.
3. What is the modulus function?

2 Mark Questions

1. Show that $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = 2x$ is injective.
2. Explain surjective and bijective functions with one example each.

3 Mark Questions

1. Explain injective, surjective and bijective functions with one example of each.
2. Show that $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = 3x + 2$ is a bijection.

Real Functions

MCQ Questions (choose the correct option)

1. The domain of $f(x) = 1/x$ is
 - (A) $\mathbb{R} - \{0\}$
 - (B) $\mathbb{R}$
 - (C) $(0, \infty)$
 - (D) $[0, \infty)$
2. The domain of $f(x) = \sqrt{x - 1}$ is
 - (A) $[1, \infty)$
 - (B) $\mathbb{R}$
 - (C) $(1, \infty)$
 - (D) $(-\infty, 1]$
3. The greatest integer function is denoted by
 - (A) $[x]$
 - (B) $|x|$
 - (C) $\{x\}$
 - (D) x
4. The function $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = x^3$ is
 - (A) odd
 - (B) even
 - (C) neither odd nor even
 - (D) constant

1 Mark Questions

1. Find the domain of $f(x) = 1/x$.
2. What is the greatest integer function?
3. Is $f(x) = x^2$ an even function?

2 Mark Questions

1. Find the domain of $f(x) = 1/(x^2 - 4)$.
2. Find the domain and range of $f(x) = \sqrt{x - 1}$.

3 Mark Questions

1. Find the domain and range of the following real functions: (i) $f(x) = 1/x$, (ii) $f(x) = \sqrt{x - 1}$, (iii) $f(x) = |x|$.
2. Explain the greatest integer and modulus functions with their graphs, and find the domain and range of each.

Algebra of Real Functions

MCQ Questions (choose the correct option)

1. If $f(x) = x + 1$ and $g(x) = x - 1$, then $(f + g)(x)$ is
 - (A) $2x$
 - (B) $x^2 - 1$
 - (C) 2
 - (D) x
2. If $f(x) = x$ and $g(x) = x$, then $(fg)(x)$ is
 - (A) x^2
 - (B) $2x$
 - (C) x
 - (D) 1
3. If $f(x) = x + 1$ and $g(x) = x$, then $(f - g)(x)$ is
 - (A) $x + 1$
 - (B) $x^2 + 1$
 - (C) x
 - (D) $2x + 1$
4. The quotient $(f/g)(x)$ is defined only when
 - (A) $g(x) \neq 0$
 - (B) $f(x) \neq 0$
 - (C) $x > 0$
 - (D) x is an integer

1 Mark Questions

1. If $f(x) = x + 1$ and $g(x) = x - 1$, find $(f + g)(x)$.
2. Define the composite function $f \circ g$.
3. For which values of x is $(f/g)(x)$ defined?

2 Mark Questions

1. If $f(x) = x + 2$ and $g(x) = 2x - 1$, find $(f + g)(x)$, $(f - g)(x)$ and $(fg)(x)$.
2. If $f(x) = x + 1$ and $g(x) = x^2$, find $(f \circ g)(x)$ and $(g \circ f)(x)$.

3 Mark Questions

1. If $f(x) = x + 1$ and $g(x) = 2x - 3$, find $(f + g)$, $(f - g)$, (fg) and (f/g) , stating the domain of (f/g) .
2. If $f(x) = x^2$ and $g(x) = x + 2$, find $(f \circ g)(x)$, $(g \circ f)(x)$ and state whether $f \circ g = g \circ f$.