Self-Assessment Quiz: Functions (Lecture 5)

Ungraded Quiz – For Practice and Understanding

Q1. A function f from set A to set B assigns:

(a) One or more elements of B to each element of A

(b) At least one element of A to each element of B

(c) Exactly one element of B to each element of A

(d) No element of A to any element of B

Q2. Which of the following relations defines a function from $X = \{2, 4, 5\}$ to $Y = \{1, 2, 4, 6\}$?

(a) $\{(2, 4), (4, 1)\}$

(b) $\{(2, 4), (4, 1), (4, 2), (5, 6)\}$

(c) $\{(2, 4), (4, 1), (5, 6)\}$

(d) $\{(2, 4), (2, 1), (5, 6)\}$

Q3. A function is said to be **well-defined** if:

(a) It has at least one image for every x

(b) It assigns exactly one output to each input

(c) It can have multiple outputs for some inputs

(d) Its graph passes through the origin

Q4. Let $f : \mathbb{Z} \to \mathbb{R}$ be defined by $f(n) = \pm n$. This function is:

(a) Well-defined

(b) Not well-defined

(c) Onto

(d) One-to-one

Q5. If $g(x) = x^2 + 1$, then the **domain**, **codomain**, and **range** of g are respectively:

(a) $\mathbb{Z}, \mathbb{R}, [0, \infty)$

(b) $\mathbb{R}, \mathbb{R}^+, [1, \infty)$

(c) $\mathbb{R}^+, \mathbb{R}, (1, \infty)$

(d) $\mathbb{R}, \mathbb{R}, [1, \infty)$

Q6. For $f : X \to Y$, the image of a subset $A \subseteq X$ is:

(a) $f(A) = \{y \in Y \mid y = f(x) \text{ for some } x \in A\}$

(b) $f(A) = \{x \in X \mid f(x) \in A\}$

(c) $f(A) = Y - A$

(d) $f(A) = A$

Q7. The **inverse image** of $C \subseteq Y$ under $f : X \to Y$ is:

(a) $f^{-1}(C) = \{y \in Y \mid f(y) \in C\}$
(b) $f^{-1}(C) = \{x \in X \mid f(x) \in C\}$
(c) $f^{-1}(C) = Y - C$
(d) $f^{-1}(C) = X$

Q8. If $f : X \to Y$ and $A, B \subseteq X$, then:

(a) $f(A \cup B) = f(A) \cup f(B)$
(b) $f(A \cup B) = f(A) \cap f(B)$
(c) $f(A \cup B) = Y$
(d) None of these

Q9. Let $f : \mathbb{R} \to \mathbb{R}$ be defined as $f(x) = x^2$. Then f is:

(a) One-to-one and onto
(b) One-to-one but not onto
(c) Onto but not one-to-one
(d) Neither one-to-one nor onto

Q10. For $f : X \to Y$, if $f^{-1}(D) = \emptyset$, this means:

(a) $f(x) \notin D$ for all $x \in X$
(b) $f(x) \in D$ for all $x \in X$
(c) $f(D) = X$
(d) $f(D) = Y$

Answers (for self-check):
1(c), 2(c), 3(b), 4(b), 5(b), 6(a), 7(b), 8(a), 9(d), 10(a)