Self-Assessment Quiz: Functions and Their Properties (Lecture 5)

Ungraded Quiz – For Practice and Understanding

Q1. A function $f : A \to B$ is defined as a special type of relation that:

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

    (b) Assigns exactly one element of B to each element of A

    (c) Relates only some elements of A to B

    (d) Has no ordered pairs

Q2. The set A in a function $f : A \to B$ is called:

    (a) Range

    (b) Codomain

    (c) Domain

    (d) Image

Q3. Which of the following is **not** a function from $X = \{1, 2, 3\}$ to $Y = \{a, b\}$?

    (a) $\{(1, a), (2, b), (3, b)\}$

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

    (c) $\{(1, a), (2, b), (3, a)\}$

    (d) $\{(1, b), (2, a), (3, a)\}$

Q4. If a function $f : \mathbb{Z} \to \mathbb{R}$ is defined by $f(x) = \sqrt{x}$, then it is:

    (a) Well-defined

    (b) Not well-defined

    (c) Onto

    (d) One-to-one

Q5. The **image** of a subset $A \subseteq X$ under f is defined as:

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

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

    (c) $f(A) = \{x \in A \mid f(x) = y\}$

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

Q6. The **inverse image** of a subset $C \subseteq Y$ 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) $f^{-1}(C) = \{y \in C \mid x \in X\}$

    (d) None of these

Q7. If $f(x) = x^2 + 1$, then the range of f is:

   (a) $\mathbb{R}$

   (b) $\mathbb{R}^+$

   (c) $[1, \infty)$

   (d) $(-\infty, 1]$

Q8. For $f : X \to Y$, if two distinct elements of X have the same image in Y, then f is:

   (a) Injective (One-to-one)

   (b) Surjective (Onto)

   (c) Not injective

   (d) Both injective and surjective

Q9. A function is said to be **onto** if:

   (a) Every element of X is mapped to a unique element in Y

   (b) Every element of Y is the image of at least one element of X

   (c) No two elements of X map to the same element in Y

   (d) $f(x)$ is always increasing

Q10. If $f : X \to Y$ and $A, B \subseteq X$, then:

   (a) $f(A \cup B) = f(A) \cap f(B)$

   (b) $f(A \cap B) = f(A) \cup f(B)$

   (c) $f(A \cup B) = f(A) \cup f(B)$

   (d) $f(A \cup B) = f(A)$

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