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Relations and Functions

Mastering Relations and Functions in Mathematics

DEFINITION

Relations connect elements from one set to another, while functions are specific types of relations where each input has a unique output.

KEY CONCEPTS

Relation

A relation is a set of ordered pairs that shows how elements from two sets are connected.

Function

A function is a relation where each input (x) is associated with exactly one output (y).

Domain and Range

The domain is the set of all possible inputs, while the range is the set of all possible outputs of a function.

Types of Functions

Functions can be classified as one-to-one, onto, or many-to-one based on their mapping characteristics.

Composite Functions

A composite function is formed when one function is applied to the results of another function.

EXAMPLES

- Relation: $\{(1,2), (2,3), (3,4)\}$
- Function: $f(x) = x^2$, where x is any real number
- Composite Function: If $f(x) = 2x$ and $g(x) = x + 1$, then $(f \circ g)(x) = 2(x + 1)$

MEMORY TIPS

- ★ Remember 'Function = Unique Output' to distinguish it from general relations.
- ★ Use the acronym DR for Domain and Range to recall their definitions.
- ★ Think of composite functions as 'function sandwiches' where one function fills the other.

COMMON MISTAKES

- ✗ Confusing relations with functions by not checking for unique outputs.
- ✗ Misidentifying the domain and range of a function.
- ✗ Forgetting to apply the correct order in composite functions.

QUICK RECAP

Relations connect elements between sets, while functions ensure unique outputs for each input. Understanding domain, range, and types of functions is crucial for solving problems effectively.