Discrete Mathematics (BCSC 1010)

Assignment-1

Set, Relations and Functions

Q1. Social Media Connections Consider a scenario where users on a social media platform can connect with each other. Define a relation that represents the "is friends with" connection. Discuss whether this relation is reflexive, symmetric, and/or transitive.

Q2. Course Enrollment In a university, students can enroll in courses. Define a function that maps each student to the courses they are enrolled in. Discuss whether this function can be both injective and surjective.

Q3. Transportation Routes Imagine a city with multiple bus stops and several bus routes connecting them. Define a relation that represents the "can be reached by taking a single bus ride" connection. Discuss the properties of this relation in terms of sets, relations, and functions.

Q4. Equivalence Relations in Programming Consider a programming scenario where you are implementing a group classification system. Define an equivalence relation that categorizes elements in the program's data structures. Explain how this equivalence relation can help optimize certain operations.

Q5. Database Relationships In a database management system, tables often have relationships. Define a function that represents a relationship between two database tables. Discuss how this function can help retrieve data efficiently in queries.

Q6. Graph Theory and Networks Imagine a network of interconnected devices in a smart home system. Define a relation that represents the "can communicate with" connection between devices. Explain how this relation can be modeled using graph theory concepts.

Q7. Describe a situation where a relation is symmetric but not reflexive. Provide a clear explanation for your example.