

Lab #2: "Cartesian Products and Relations"

Objective: Understand and implement the Cartesian product of sets and related operations.

1. Basic Cartesian Product (Score: 60-74)

- **cartesianProduct(setA, setB):** Generates the Cartesian product of two sets.
 - Input: ([1,2], ['a','b'])
 - Output: [(1,'a'), (1,'b'), (2,'a'), (2,'b')]

2. Relation Testing and Advanced Operations (Score: 75-89)

- **isRelationValid(relation, setA, setB):** Validates if a given relation (list of ordered pairs) is valid for the Cartesian product of two sets.
 - Input:([(1,'a'), (2,'b')], [1,2], ['a','b'])
 - Output: True
- **findRelations(setA, relationFunc):** Finds all the relations for a given set based on a relation function.
 - Example function: "All numbers divisible by another number in the set".
 - Input: ([1,2,3,4,6], isDivisible)
 - Output: [(2,1), (4,1), (4,2), (6,1), (6,2), (6,3)]

3. Advanced Cartesian Product with Filters (Score: 90-100)

- **filteredCartesianProduct(setA, setB, filterFunc):** Generates the Cartesian product, but only includes pairs that satisfy the filter function.
 - Example function: "Only pairs where a number from setA is less than a number from setB".
 - Input: ([1,2,3], [3,4,5], filterFunction)
 - Output: [(1,3), (1,4), (1,5), (2,3), (2,4), (2,5)]