Set Operations On Numbers

DS group Project
Computer Science Project
Section B
3rd Sem

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Problem Statement:

Write a C application to implement a complete library for Set Operations on numbers. The library must provide options for creating sets, you are free to use any data structure. Perform the following Operations:

i) Union of Sets

ii) Intersection

iii) Set Membership

iv) Complement

v) Compute Power Set

vi) Set Difference

vii) Set Inclusion

viii) Cartesian Product

Data Structure Employed :

Doubly Linked List without header node and not circularly linked.

```
typedef struct Node{

    int number;

    struct Node *right_ptr;

    struct Node *left_ptr;

}Node;
```

Algorithm

i) **Union Of Sets:**

Step 1: Join Both the linked list

Step 2: Delete every Duplicate element

ii) Intersection Of Sets

Step 1: For each element in the first linked list, iterate through the 2nd list.

Step 2: Repeat until end of list 1.

Step 3: If a same element is found, add that to a new list

iii) Set Membership

Step 1: Ask user for an element to compare

Step 2: Iterate through list and Check if it is present in list 1.

Step 3: Do the same for list 2.

iv) Compliment

Step 1: Take list 1 as the Universal Set.

Step 2: Display all elements present in list one but not in Universal Set

v) Power Set

Step 1: Find the number of elements(n) in the given List

Step 2: Run a for loop for 0 to n-1

Step 3: For each iteration a different Sequence of binary codes will be generated which selects whether an element is there in that set or not.

Step 4: Display each of combination.

vi) Set Difference

Step 1: Assume list 1 - list 2

Step 2: For every element in list 2 run a loop

Step 3: Check if the Corresponding number is present in list 1 and delete it.

vii) Set Inclusion:

Step 1: Check if every element of list 2 is present in list 1

Step 2: If condition is satisfied, then list 2 is a subset of list 1.

viii) Cartesian Product:

Step 1: For an element is list 1, make a pair with every element of list 2

Step 2: Do this for every element in list 1.