* Data Structure Lab (DSL):- Practical Number - 1 (Group - A)

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Title :-
Write a code in python to study set operations using lists.

Aim :-
In SE computer engineering class, group A students play cricket, group B studen play badminton and group C student play football.
Write a python program using function to compute :-
1) List of student who play both cricket and badminton.
2) List of student who play either cricket or badminton but not both.
3) Number of student who play neither cricket nor badminton.
4) Number of student who play cricket and football but not badminton.

Objective :-
To learn set operations using list in python.

Theory :-
Set -
A set is a collection of well defined and distinct objects.

Union of Set:-

Union of two sets A and B is the set consisting all elements which are in A or in B or in both A and B.

$$A \cup B = \{x | x \in A \text{ or } x \in B\}$$

Examples:-

$A = \{a, b, c, d, e, f, i\}$

$B = \{a, b, c, d, e, f, g, h\}$

$A \cup B = \{a, b, c, d, e, f, g, h, i\}$

Intersection of Set:-

Intersection of two set A and B is the set consisting of elements which are in A as well as B.

$$A \cap B = \{x | x \in A \text{ and } x \in B\}$$

Examples:-

$A = \{1, 2, 3, 4, 5, 6, 7\}$

$B = \{0, 2, 4, 6, 8, 10\}$

$A \cap B = \{2, 4, 6\}$

Difference of Set:-

The set difference of sets A and B, is the set of all elements in A that are not in B.

$$A - B = \{x | x \in A \text{ and } x \notin B\}$$

Example:-

$A = \{1, 2, 3, 4, 5\}$

$B = \{1, 3, 5\}$

$A - B = \{2, 4\}$

$B - A = \{\phi\}$

Symmetric Difference:-

Symmetric difference of two sets which are either of the set but not in their intersection.

$$A \oplus B = \{x | x \in A-B \text{ or } x \in B-A\}$$

Example:-

$A = \{a, b, e, g\}$

$B = \{d, e, f, g\}$

$A \oplus B = \{a, b, d, f\}$

Algorithm:-

Step 1- Start

Step 2- Accept total number of student in the class.

Step 3- Enter the number of student playing cricket, badminton and football.

Step 4- Accept the name of student playing cricket, badminton and football. Store them in three different lists.

Step 5- Write function to remove duplicate elements from list.

Step 6- Remove duplicate elements from the three list created in step 4.

Step 7- Print the name of students present in each list.

Step 8- Calculate the number of students playing both cricket and badminton (Intersection of both).

Step 9 - Show the number and name of students playing both cricket and bad-

Step 10 - Calculate the number of students who play either cricket or badminton but not both.

Step 11 - Display the names and number of these students.

Step 12 - Calculate number of students who play neither cricket nor badm-inton.

Step 13 - Display total number and names of these students.

Step 14 - Calculate number of student who play cricket and football but not badminton.

Step 15 - Display total number and names of these students.

Step 16 - Stop.

Analysis -

The time complexity of all the function in the program is O(n).

Conclusion -

Hence, we have studied set operations in python using lists.