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| ASSIGNMENT 1 |
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# Assignment 1

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| **Objective :**  To illustrate the use of array for performing various set operations  **Outcome :**  Students will be able to use various set operations using array for solving problems.  **Problem Statement :**  In second year computer engineering class, group A student’s play cricket, group B  students play badminton and group C students play football.  Write a Python program using functions to compute following: -  a) List of students who play both cricket and badminton  b) List of students who play either cricket or badminton but not both  c) Number of students who play neither cricket nor badminton  d) Number of students who play cricket and football but not badminton.  (Note- While realizing the group, duplicate entries should be avoided, Do not use SET  built-in functions)  **Algorithm :**  **1.Union Function:-**   1. **start** 2. **Intilise the list\_return as sum of given two list .** 3. **for every i element in first list jump to step4 else s step6.** 4. **if i is in list 2 jump to step5 else step3.** 5. **Remove i from list\_return jump to step 3.** 6. **Return list\_return** 7. **exit()**   **2.Intersection Function:-**   1. **start** 2. **Intilise the list\_return as an empty list .** 3. **for every i element in first list jump to step4 else s step6.** 4. **if i is in list 2 jump to step5 else step3.** 5. **Append i to list\_return jump to step 3.** 6. **Return list\_return** 7. **exit()**   **3.Difference Function:-**   1. **start** 2. **Intilise the list\_return as copy of first list .** 3. **for every i element in intersection of both lists jump to step4 else step5.** 4. **Remove i from list\_return jump to step 3.** 5. **Return list\_return** 6. **exit()**   **4.Difference Function:-**   1. **start** 2. **Intilise a\_b as difference of a from b.** 3. **Intilise b\_a as difference of b from a.** 4. **Return addition of a\_b and b\_a.** 5. **exit()**   **Program/Code:** |
| def union(a, b):  list\_return = a + b  for i in a:  if i in b:  list\_return.remove(i)  return list\_return   def intersection(a, b):  list\_return = []  for i in a:  if i in b:  list\_return.append(i)  return list\_return   def difference(a, b):  list\_return = a.copy()  for i in intersection(a, b):  list\_return.remove(i)  return list\_return   def symmetric\_difference(a, b):  a\_b = difference(a, b)  b\_a = difference(b, a)  return a\_b + b\_a    cricket = input("Enter The List of student who play cricket : ").split(" ")  badmination = input("Enter The List of student who play badmination : ").split(" ")  football = input("Enter The List of student who play football : ").split(" ")  print("\n") print("List of students who play either cricket or badminton but not both :") print(symmetric\_difference(cricket, badmination)) print("-------------------------------------------------------------------------")  print("List of students who play both cricket and badminton :") print(union(cricket, badmination)) print("-------------------------------------------------------------------------")  print("Number of students who play neither cricket nor badminton : ", len(difference(football, union(cricket, badmination)))) print("-------------------------------------------------------------------------")  print("Number of students who play cricket and football but not badminton : ", end="") print(len(difference(intersection(cricket, football), badmination))) print("-------------------------------------------------------------------------") |
| **Output :** |

**Time Complexity :**

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| sr no. | Function | Frequency Count | Time Complexity |
| 1 | Union | 1+(n+1)+ n2+n+1= n2 +2n+3 | O(n2) |
| 2 | Intersection | 1+(n+1)+ n2+n+1= n2 +2n+3 | O(n2) |
| 3 | difference | 1+(n2+2n+3)+n+1+ n+1= n2 +4n+6 | O(n2) |
| 4 | symmetric\_difference | 2\*( n2 +4n+6)+1= 2n2+8n+13 | O(n2) |
| 5 | length | 1 | O(1) |
| 6 | print | 1 | O(1) |

Total

= 1\*symmetric\_difference+2\*union+2\*difference+1\*intersection+2\*length+6\*print+3\*input+3\*split()

= 2n2+8n+13 + 2(n2 +2n+3) + 2(n2 +4n+6) + (n2 +2n+3) + 2\*1 +6\*1+3\*1+3\*1

= 6n2+22n+48

Total Time Complexity:= O(n2)

Conclusion :-

Illustrated the use of array for performing various set operations.