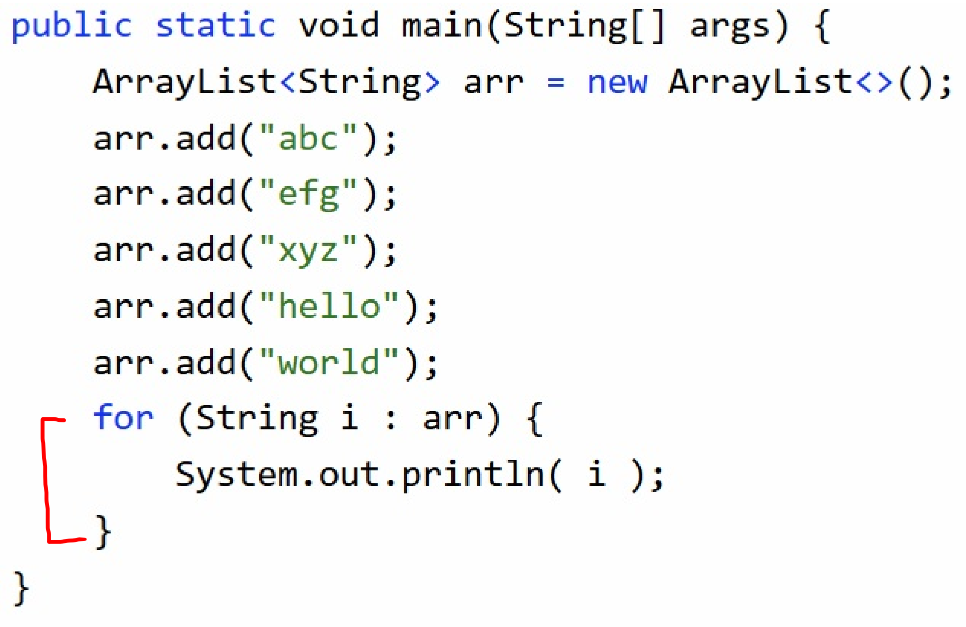
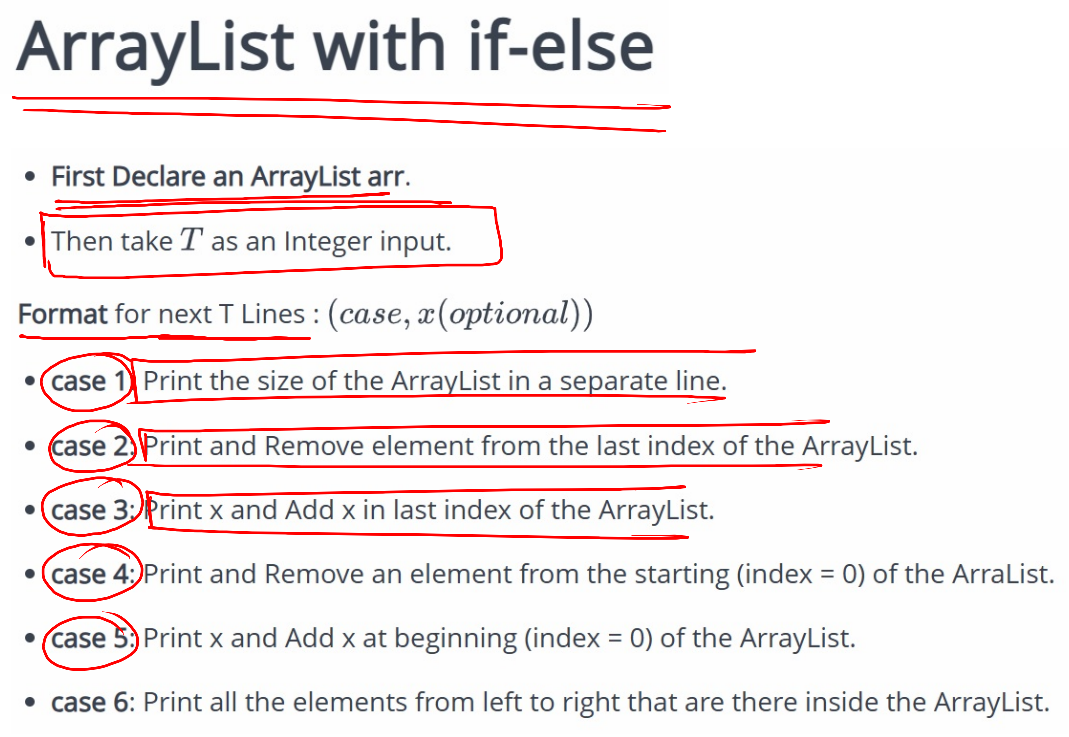
⇒ for each loop

```
for (datatype var : arr){
        // statement
}
```

code



```
public static void main(String[] args) {
    ArrayList<String> arr = new ArrayList<>();
    arr.add("abc");
    arr.add("efg");
    arr.add("xyz");
    arr.add("hello");
    arr.add("world");
    for (String i : arr) {
        System.out.println( i );
    }
}
```



ArrayList with if-else

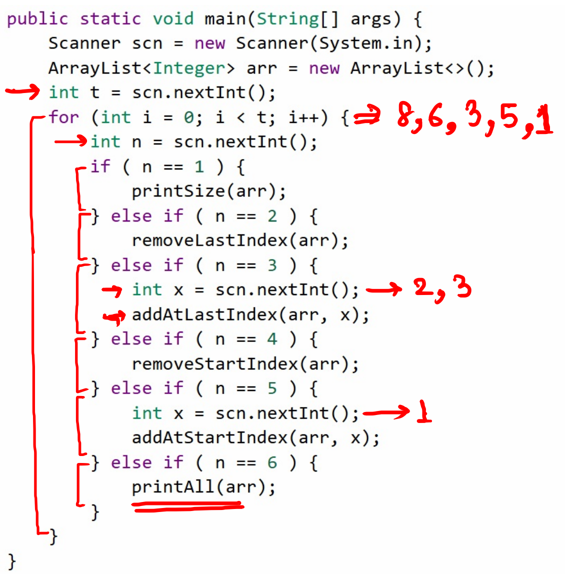
- **First Declare an ArrayList arr.**
- Then take T as an Integer input.

Format for next T Lines : $(case, x(optional))$

- **case 1**: Print the size of the ArrayList in a separate line.
- **case 2**: Print and Remove element from the last index of the ArrayList.
- **case 3**: Print x and Add x in last index of the ArrayList.
- **case 4**: Print and Remove an element from the starting (index = 0) of the ArraList.
- **case 5**: Print x and Add x at beginning (index = 0) of the ArrayList.
- **case 6**: Print all the elements from left to right that are there inside the ArrayList.

psudo code

```
1) declare an AL
2) t = 3
    2.1) n = 2
         n = 3
         n = 1
```



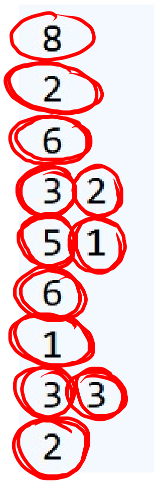
```java
public static void main(String[] args) {
    Scanner scn = new Scanner(System.in);
    ArrayList<Integer> arr = new ArrayList<>();
    int t = scn.nextInt();
    for (int i = 0; i < t; i++) {
        int n = scn.nextInt();
        if ( n == 1 ) {
            printSize(arr);
        } else if ( n == 2 ) {
            removeLastIndex(arr);
        } else if ( n == 3 ) {
            int x = scn.nextInt();
            addAtLastIndex(arr, x);
        } else if ( n == 4 ) {
            removeStartIndex(arr);
        } else if ( n == 5 ) {
            int x = scn.nextInt();
            addAtStartIndex(arr, x);
        } else if ( n == 6 ) {
            printAll(arr);
        }
    }
}
```

⇒ 8,6,3,5,1

→ 2,3

→ 1

i/p



```
8
2
6
3 2
5 1
6
1
3 3
2
```

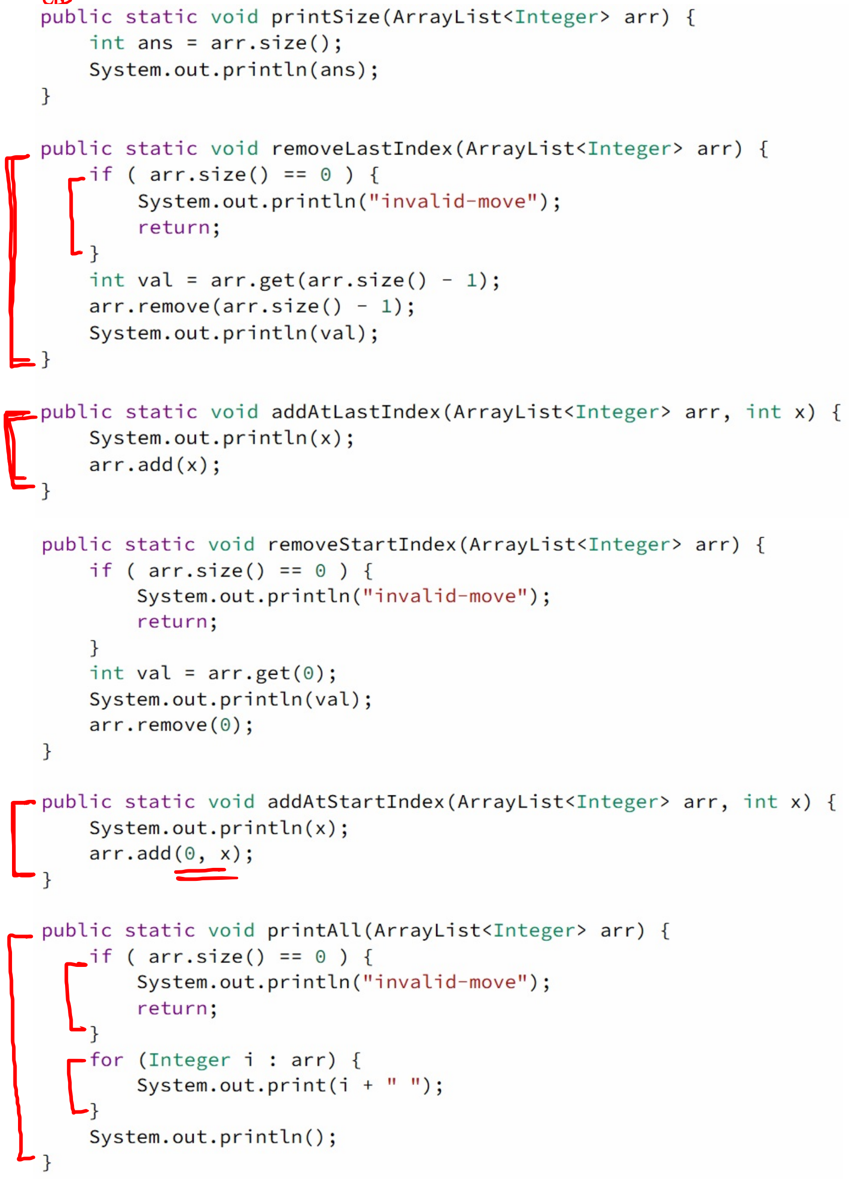
AL = size=0

AL = [2]

AL = [1|2]

AL = [1|2|~~3~~]

i/p



```java
public static void printSize(ArrayList<Integer> arr) {
    int ans = arr.size();
    System.out.println(ans);
}

public static void removeLastIndex(ArrayList<Integer> arr) {
    if ( arr.size() == 0 ) {
        System.out.println("invalid-move");
        return;
    }
    int val = arr.get(arr.size() - 1);
    arr.remove(arr.size() - 1);
    System.out.println(val);
}

public static void addAtLastIndex(ArrayList<Integer> arr, int x) {
    System.out.println(x);
    arr.add(x);
}

public static void removeStartIndex(ArrayList<Integer> arr) {
    if ( arr.size() == 0 ) {
        System.out.println("invalid-move");
        return;
    }
    int val = arr.get(0);
    System.out.println(val);
    arr.remove(0);
}

public static void addAtStartIndex(ArrayList<Integer> arr, int x) {
    System.out.println(x);
    arr.add(0, x);
}

public static void printAll(ArrayList<Integer> arr) {
    if ( arr.size() == 0 ) {
        System.out.println("invalid-move");
        return;
    }
    for (Integer i : arr) {
        System.out.print(i + " ");
    }
    System.out.println();
}
```

code

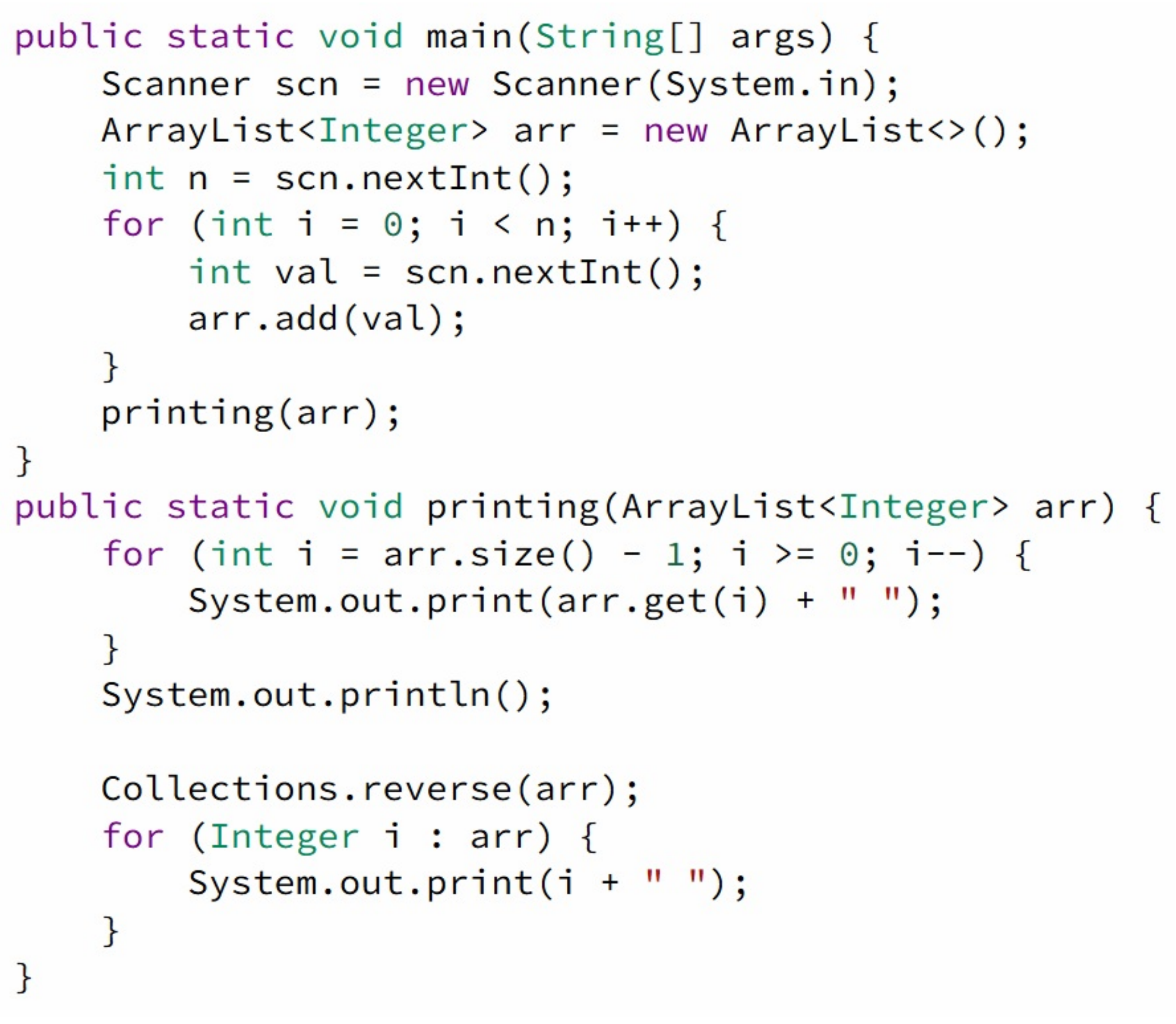
invalid
invali
2
1
1 2
2
3
3

⇒ Inbuilt functions

- sort an array :- `Arrays.sort(arr);`
- sort an arraylist :-
  - ↑ing order : `Collections.sort(list);`
  - ↓ing order :-

    `Collections.sort(list, Collections.reverseOrder())`
- reverse the AL :- `Collections.reverse(arr);`

ArrayList reverse printing



```java
public static void main(String[] args) {
    Scanner scn = new Scanner(System.in);
    ArrayList<Integer> arr = new ArrayList<>();
    int n = scn.nextInt();
    for (int i = 0; i < n; i++) {
        int val = scn.nextInt();
        arr.add(val);
    }
    printing(arr);
}
public static void printing(ArrayList<Integer> arr) {
    for (int i = arr.size() - 1; i >= 0; i--) {
        System.out.print(arr.get(i) + " ");
    }
    System.out.println();

    Collections.reverse(arr);
    for (Integer i : arr) {
        System.out.print(i + " ");
    }
}
```

Merge two sorted arrays

i

↓

A = [2, 3, 5, 7] X ↑ing

B = [3, 4, 5, 7, $\underbrace{9, 10, 11]}$ ↑ing

↑

j

AL = [2, 3, 3, 4, 5, 5, 7, 7, 9, 10, 11] ↑ing

psudo code

```
1) declare i=0, j=0
2) loop until i< A.length && j<B.length
    2.1) check if A[i] < B[j]
             then arr.add (A[i]); i++;
    2.2) else
             arr.add (B[j]); j++;

3) loop until i< A.length
    arr.add (A[i]); i++;

4) loop until j < B.length
    arr.add (B[j]); j++;
```

→ how to remove duplicate elements

$$AL = [\overset{0}{2}, \overset{1}{\cancel{3}}, \overset{2}{3}, \overset{3}{4}, \overset{4}{5}, \overset{5}{5}, \overset{6}{7}, \overset{7}{7}, \overset{8}{9}, \overset{9}{10}, \overset{10}{11}]$$

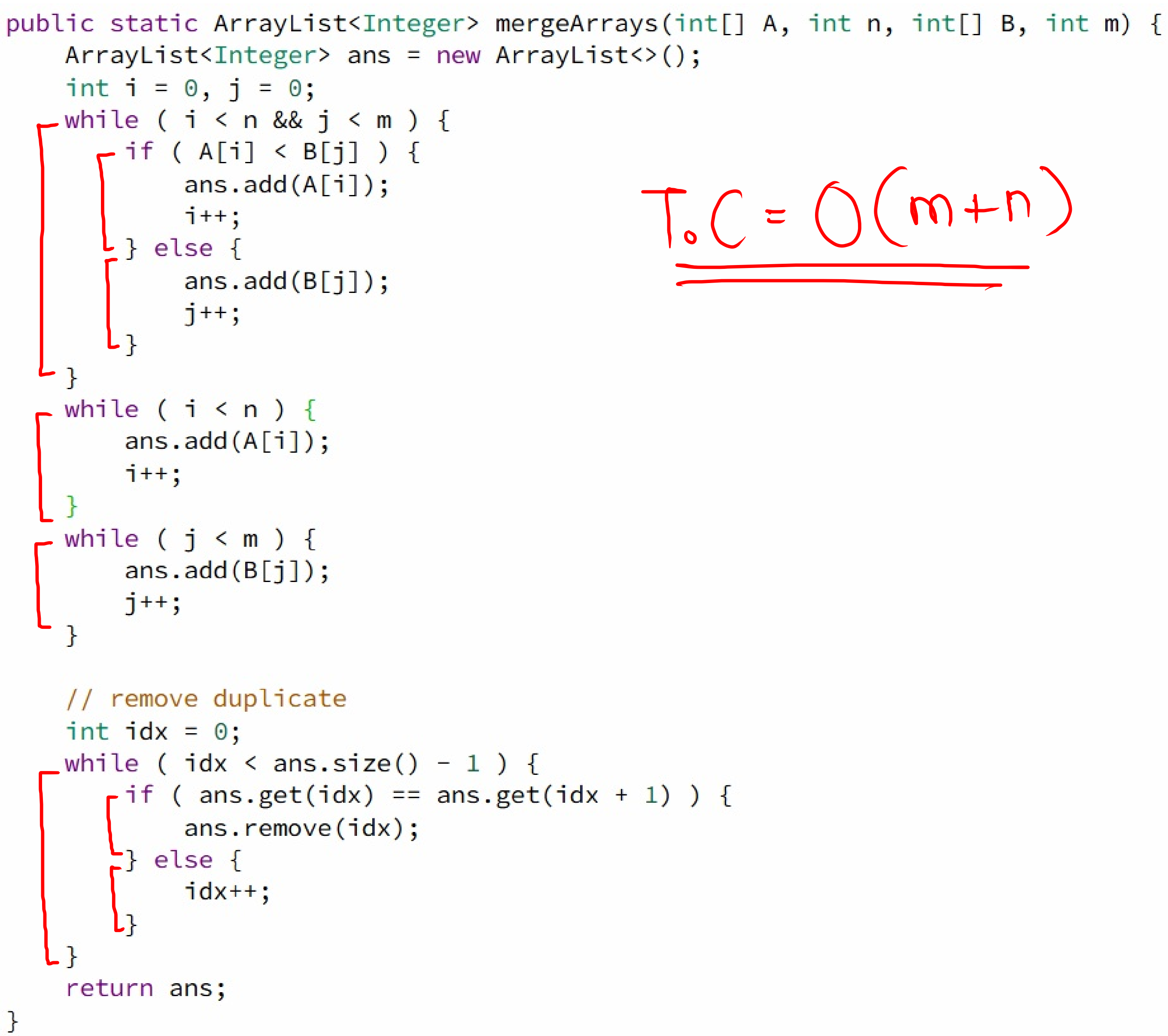
$$AL = [\overset{0}{2}, \overset{1}{3}, \overset{2}{4}, \overset{3}{\cancel{5}}, \overset{4}{5}, \overset{5}{7}, \overset{6}{7}, \overset{7}{9}, \overset{8}{10}, \overset{9}{11}]$$

$$AL = [\overset{0}{2}, \overset{1}{3}, \overset{2}{4}, \overset{3}{5}, \overset{4}{\cancel{7}}, \overset{5}{7}, \overset{6}{9}, \overset{7}{10}, \overset{8}{11}]$$

$$AL = [\overset{0}{2}, \overset{1}{3}, \overset{2}{4}, \overset{3}{5}, \overset{4}{7}, \overset{5}{9}, \overset{6}{10}, \underset{\underset{i}{\uparrow}}{\overset{7}{11}}]$$

ans

code



```
public static ArrayList<Integer> mergeArrays(int[] A, int n, int[] B, int m) {
    ArrayList<Integer> ans = new ArrayList<>();
    int i = 0, j = 0;
    while ( i < n && j < m ) {
        if ( A[i] < B[j] ) {
            ans.add(A[i]);
            i++;
        } else {
            ans.add(B[j]);
            j++;
        }
    }
    while ( i < n ) {
        ans.add(A[i]);
        i++;
    }
    while ( j < m ) {
        ans.add(B[j]);
        j++;
    }

    // remove duplicate
    int idx = 0;
    while ( idx < ans.size() - 1 ) {
        if ( ans.get(idx) == ans.get(idx + 1) ) {
            ans.remove(idx);
        } else {
            idx++;
        }
    }
    return ans;
}
```

$T.C = O(m+n)$