

## Equivalent Subarrays in C++

```
#include <iostream>
#include <unordered_map>
#include <unordered_set>
#include <vector>

using namespace std;

int main() {
    int ans = 0;
    vector<int> arr = {2, 1, 3, 2, 3};
    unordered_set<int> set;

    // Insert unique elements into the set
    for (int i = 0; i < arr.size(); i++) {
        set.insert(arr[i]);
    }

    int k = set.size();
    int i = -1;
    int j = -1;
    unordered_map<int, int> map;

    while (true) {
        bool f1 = false;
        bool f2 = false;

        // Expand the window until all
        // unique elements are covered
        while (i < arr.size() - 1) {
            f1 = true;
            i++;
            map[arr[i]] = map[arr[i]] + 1; //
            Add current element to the map
            if (map.size() == k) { // If all
            unique elements are covered
                ans += arr.size() - i; // Add the
                number of valid subarrays ending at
                index i
                break;
            }
        }

        // Slide the window to the right
        // until the uniqueness condition is
        // violated
        while (j < i) {
            f2 = true;
            j++;
            if (map[arr[j]] == 1) {
                map.erase(arr[j]); // Remove
                element from map if its count is
                reduced to 0
            } else {
                map[arr[j]] = map[arr[j]] - 1; //
                Decrease the count of the element
            }
        }

        // If the map size matches k, add
        // the number of valid subarrays again
        if (map.size() == k) {
            ans += arr.size() - i;
        }
    }
}
```

### Step 1: Initializing Variables

- **Input Array:** {2, 1, 3, 2, 3}
- **Unique Elements (set):**

{2, 1, 3} → k = 3 (total unique elements)

- **Pointers:**

i = -1, j = -1

ans = 0

map = {} (empty frequency map)

### Step 2: Expanding the Window (Outer while Loop)

Expanding i Until map.size() == k

i	arr[i]	map (after update)	map.size()	Condition map.size() == k?
0	2	{2: 1}	1	✗
1	1	{2: 1, 1: 1}	2	✗
2	3	{2: 1, 1: 1, 3: 1}	3	✓ → Add arr.size() - i = 5 - 2 = 3 to ans

- ans = 3

### Step 3: Contracting j Until map.size() < k

j	arr[j]	map (after update)	map.size()	Condition map.size() == k?	ans Update
0	2	{2: 0, 1: 1, 3: 1} → removed 2	2	✗	Break

### Step 4: Continue Expanding i

i	arr[i]	map (after update)	map.size()	Condition map.size() == k?	ans Update
3	2	{1: 1, 3: 1, 2: 1}	3	✓	Add arr.size() - i = 5 - 3 = 2
<b>New ans</b>	<b>3 + 2 = 5</b>				

```
        } else {
            break;
        }
    }

    // If both windows cannot be
    expanded or contracted further, break
    the loop
    if (!f1 && !f2) {
        break;
    }
}

// Print the total number of
equivalent subarrays
cout << ans << endl;

return 0;
}
```

**Step 5: Contracting j Again**

j	arr[j]	map (after update)	map.size()	Condition map.size() == k?	ans Update
1	1	{1: 0, 3: 1, 2: 1} → removed 1	2	✗	Break

**Step 6: Continue Expanding i**

i	arr[i]	map (after update)	map.size()	Condition map.size() == k?	ans Update
4	3	{3: 2, 2: 1}	2	✗	No update

**Final Output**

5

**Summary of Valid Subarrays**

- The total number of subarrays containing all **3 distinct elements** {1, 2, 3} is **5**.

Output:-  
0