

## Practical-2

## Bubble Sort

## Iterative Approach:

```
main.cpp
1  #include <iostream>
2  #include <vector>
3  #include <algorithm>
4  using namespace std;
5
6  int main() {
7      int n;
8      cout << "Enter the size of array: ";
9      cin >> n;
10
11     vector<int> in(n);
12     cout << "Enter " << n << " elements:\n";
13     for(int i = 0; i < n; i++) {
14         cin >> in[i];
15     }
16
17     int counter = 0;
18
19     counter += 2;
20     counter++;
21
```

```
main.cpp
22     for (int i = 0; i < n - 1; i++) {
23         counter++;
24         counter++;
25
26         for (int j = 0; j < n - 1 - i; j++) {
27             counter++;
28             counter++;
29             counter++;
30
31             if (in[j] > in[j + 1]) {
32                 counter++;
33                 swap(in[j], in[j + 1]);
34             }
35
36             counter++;
37         }
38
39         counter++;
40         counter++;
41     }
```

## Practical-2

```
41     }  
42  
43     counter++;  
44     counter++;  
45  
46     cout << "Counter using Iterative Approach (Worst Case): " <<  
         counter;  
47     return 0;  
48 }
```

## INPUT(3)

```
Enter the size of array: 3  
Enter 3 elements:  
1 6 8  
Counter using Iterative Approach (Worst Case): 25  
  
=== Code Execution Successful ===
```

## INPUT(5)

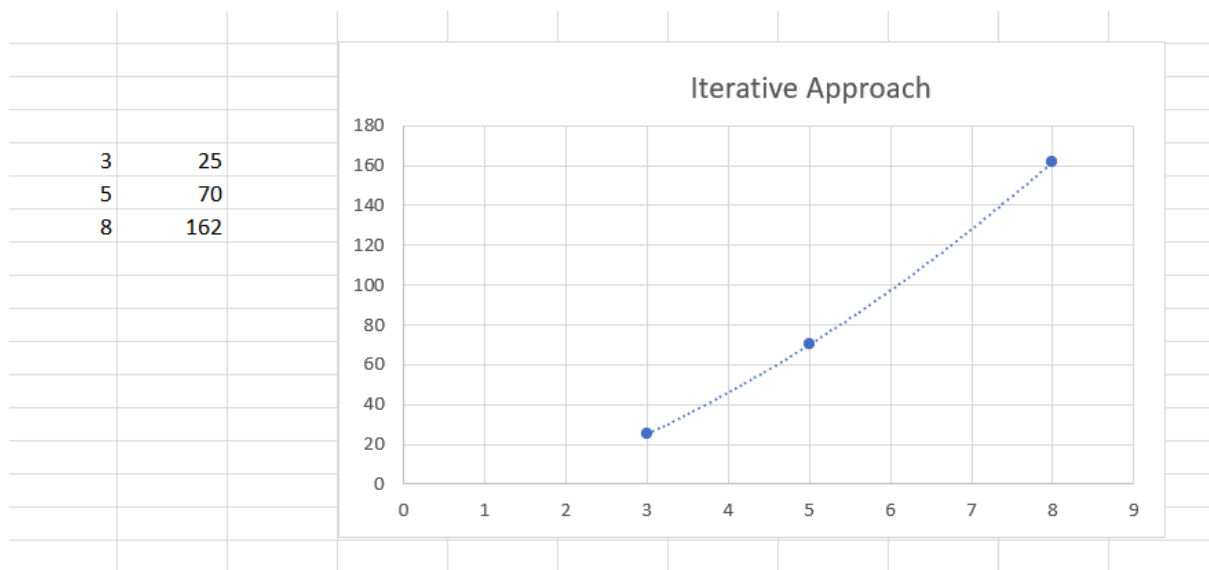
```
Enter the size of array: 5  
Enter 5 elements:  
45 55 15 12 4  
Counter using Iterative Approach (Worst Case): 70
```

## INPUT(8)

```
Enter the size of array: 8  
Enter 8 elements:  
14 25 3 1 7 9 8 5  
Counter using Iterative Approach (Worst Case): 162  
  
=== Code Execution Successful ===
```

## Graph:

## Practical-2



### Recursive Approach:

main.cpp

```
1 #include <iostream>
2 #include <vector>
3 #include <algorithm>
4 using namespace std;
5
6 int counter = 0;
7
8 void bubble(vector<int> &in, int n) {
9     counter++;
10    counter++;
11    if (n == 1) {
12        counter++;
13        return;
14    }
15
16    counter++; // i = 0
17    for (int i = 0; i < n - 1; i++) {
18        counter++;
19        counter++;
20        counter++;
```

## Practical-2

```
main.cpp [ ] [ ] Share Run

22     if (in[i] > in[i + 1]) {
23         counter++;
24         swap(in[i], in[i + 1]);
25     }
26     counter++;
27 }
28
29 counter++;
30 counter++;
31 counter++;
32 bubble(in, n - 1);
33 }
34
35 int main() {
36     int n;
37     cout << "Enter the size of array: ";
38     cin >> n;
39
40     vector<int> in(n);
41     cout << "Enter " << n << " elements:\n";
42     for(int i = 0; i < n; i++) {
43         cin >> in[i];
44     }
45
46     counter += 2;
47     counter++;
48     bubble(in, n);
49
50     counter++;
51
52     cout << "Input Size: " << n << endl;
53     cout << "Counter using Recursive Approach (Worst Case): " <<
        counter << endl;
54
55     return 0;
56 }
```

## INPUT(3)

## Practical-2

```
Enter the size of array: 3
Enter 3 elements:
5 7 3
Input Size: 3
Counter using Recursive Approach (Worst Case): 33

=== Code Execution Successful ===
```

## INPUT(5)

```
Enter the size of array: 5
Enter 5 elements:
4 9 7 5 6
Input Size: 5
Counter using Recursive Approach (Worst Case): 76

=== Code Execution Successful ===
```

## INPUT(6)

```
Enter the size of array: 6
Enter 6 elements:
2 3 45 12 32 22
Input Size: 6
Counter using Recursive Approach (Worst Case): 101
```

Graph:

## Practical-2

