

Bubble Sort

Iterative Approach:

The screenshot shows a code editor window titled "main.cpp". The code is as follows:

```
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}
```

The screenshot shows a code editor window titled "main.cpp". The code is as follows, with line 32 highlighted:

```
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++; | swap(in[j], in[j + 1]);
33            }
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)

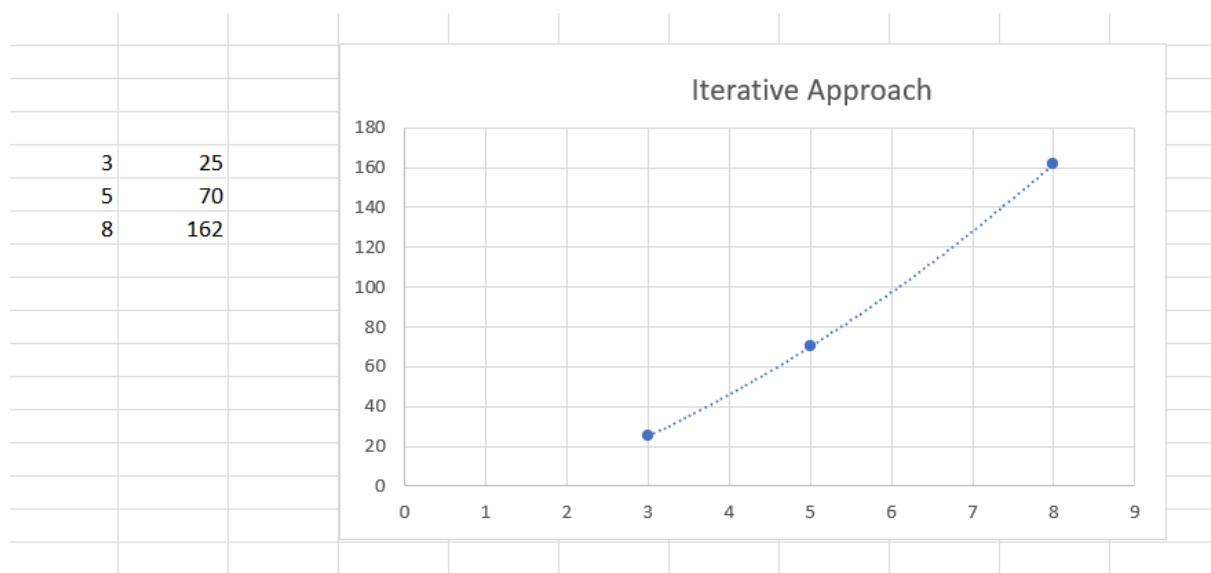
```
Enter the size of array: 5
Enter 5 elements:
45 55 15 12 4
Counter using Iterative Approach (Worst Case): 70
```

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
```

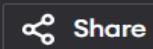
Run

```
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

```
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;
```

**Run**

```
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

