Data Structures and Algorithms
Lab Task

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Task 1:

```cpp
#include <iostream>
using namespace std;
int main(){
    int terms;
    int x,y;
    cout <<"Enter the starting value: ";
    cin>>y;
    cout<<"Enter the stopping value: ";
    cin>>terms;
    int sum;
    for(int i = y; i <= terms; i++){
        sum += (i*i);
    }
    cout << "The sum is " << sum << endl;
    }
```

Output:

```
1.exe'
Enter the starting value: 5
Enter the stopping value: 10
The sum is 4201651
```

Task 2:

```cpp
#include <iostream>
using namespace std;
int main(){
    int x;
    cout << "Enter the number of elements of arrays: ";
    cin>>x;
    int arr[x];
    int option;
    while(true){

    int val;
    cout<<"1: Insert the value at the end of the list: " <<endl;
    cout<<"2: Insert the value at the start of the list: " << endl;
    cout<<"3: Insert the value after specific value: "<<endl;
    cout<<"4: Insert the value before specific value: "<<endl;
    cout<<"5: Display the array List: "<<endl;
    cout<<"6: Delete the value from end of the list: " <<endl;
    cout<<"7: Delete the value from the start of the list"<<endl;
```

```
    cout<<"8: Delete the specific value"<<endl;

    cout<< "Choose the option from 1 - 8"<<endl;
    cin>>option;
    switch(option){
        case 1:
            cin>>val;
            arr[x-1] = val;
            break;
        case 2:
            cin>>val;
            arr[0] = val;
            break;
        case 3:
            cin>>val;
            cout << "Enter a specific Value:";
            int elem;
            cin >>elem;
            arr[val]=elem;
            break;
        case 4:
            cin>>val;
            cout << "Enter a specific Value:";
            int elem2;
            cin >>elem2;
            arr[val-1]=elem2;
            break;
        case 5:
            for(int i=0;i < x;i++){
                cout <<arr[i] << endl;
            }
            break;
        case 6:
            cin>>val;
            arr[x-1] = 0;
            break;
        case 7:
            cin>>val;
            arr[0] = 0;
            break;
        case 8:
            cin>>val;
            arr[val-1] = 0;
            break;
        default:
```

```
            cout<<"Please choose a valid option: ";

    }
}
}
```

Output:

```
Enter the number of elements of arrays: 5
1: Insert the value at the end of the list:
2: Insert the value at the start of the list:
3: Insert the value after specific value:
4: Insert the value before specific value:
5: Display the array List:
6: Delete the value from end of the list:
7: Delete the value from the start of the list
8: Delete the specific value
Choose the option from 1 - 8
5
40
1878278336
300402953
32
16
```

```
16
1: Insert the value at the end of the list:
2: Insert the value at the start of the list:
3: Insert the value after specific value:
4: Insert the value before specific value:
5: Display the array List:
6: Delete the value from end of the list:
7: Delete the value from the start of the list
8: Delete the specific value
Choose the option from 1 - 8
1
10
1: Insert the value at the end of the list:
2: Insert the value at the start of the list:
3: Insert the value after specific value:
4: Insert the value before specific value:
5: Display the array List:
6: Delete the value from end of the list:
7: Delete the value from the start of the list
8: Delete the specific value
Choose the option from 1 - 8
5
40
1878278336
300402953
32
10
```

Task 2b:

```cpp
// HASAAN AHMAD
// SP22-BSE-017

#include<iostream>
#include<list>
using namespace std;
// METHOD TO PRINT LIST
void showlist(list<int> g)
{
    list<int>::iterator it;
    for (it = g.begin(); it != g.end(); ++it)
        cout << '\t' << *it;
    cout << '\n';
}

// MAIN METHODS
int main()
{
    list<int> myList = {23,4,35,65};
    // TO ACCESS THE LAST ELEMENT
    cout<<myList.back();
    // To Insert in the end
    myList.emplace_back(30);
    showlist(myList);
    // To insert in the start
    myList.emplace_front(20);
    showlist(myList);
    // Insert at specific position
    // Takes pointer
    auto it = myList.begin();
    // ADVANCING THE ITERATOR
    advance(it,2);
    myList.emplace(it,15);
    showlist(myList);


    // To remove first element
    myList.pop_front();
    showlist(myList);
    // To remove last element
    myList.pop_back();
    showlist(myList);
```

```
// TO REMOVE AT SPECIFIC PLACE
    it = myList.begin();
    advance(it,2);
    myList.erase(it);
    showlist(myList);

// NICELY DONE SEE YA LATER
    return 0;
}
```

Output:

```
t'
PS D:\Ishtudy Material\3rd Sem\DSA\LAB\LAB 01\output> & .\'lab2Li
65      23      4       35      65      30
        20      23      4       35      65
  30
        20      23      15      4       35
  65    30
        23      15      4       35      65
  30
        23      15      4       35      65
        23      15      35      65
PS D:\Ishtudy Material\3rd Sem\DSA\LAB\LAB 01\output>
```

Task 3:

```
#include <iostream>
using namespace std;

int main() {
   int arr[] = { 3, 5, 2, 8, 1, 9 };
   int n = sizeof(arr) / sizeof(arr[0]); // Calculate the size of the array
   int key = 8; // Element to search
   int i = 0;

   while (i < n && arr[i] != key) {
      i++;
   }
```

```
    if (i < n) {
        cout << "Element found at index " << i << endl;
    }
    else {
        cout << "Element not found" << endl;
    }

    return 0;
}
```

Output: