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Course: Data Structure And Algorithm

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TASK # 1

Code

The screenshot shows the Visual Studio Code interface with the file explorer on the left displaying a project named 'ABDUL MOIZ MANSAB.44647'. The file 'Task1.cpp' is selected and open in the editor. The code in 'Task1.cpp' is as follows:

```
1 #include<iostream>
2 using namespace std;
3
4 int main() {
5
6     int array[10]={1,2,3,4,5,6,7,8,9,10};
7     for(int i=0; i<10; i++)
8     {
9         cout<<array[i]<<endl;
10    }
11
12    return 0;
13 }
```

The output window on the right shows the command prompt output for running 'Task1.cpp':

```
sh:\Desktop\Abdul Moiz Mansab.44647> cd
"c:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647\" ; if ($?) { g++ Tas
k1.cpp -o Task1 } ; if ($?) { .\Task1 }
1
2
3
4
5
6
7
8
9
10
PS C:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647>
```

TASK # 2

Code

The screenshot shows the Visual Studio Code interface with the file explorer on the left displaying a project named 'ABDUL MOIZ MANSAB.44647'. The file 'Task2.cpp' is selected and open in the editor. The code in 'Task2.cpp' is as follows:

```
1 #include<iostream>
2 using namespace std;
3
4 int main() {
5     int Value;
6     cout<<"Enter search value: "<<endl;
7     cin>>Value;
8     bool found=false;
9     int numbers[10]={13, 14, 12, 15, 16, 32, 56, 47, 78, 29};
10    for(int i=0; i<10; i++)
11    {
12        if(numbers[i]==Value)
13        {
14            found=true;
15            cout<<"search found"<<endl;
16            break;
17        }
18    }
19    if(found==false)
20    {
21        cout<<"Search not found"<<endl;
22    }
23
24    return 0;
25 }
```

The output window on the right shows the command prompt output for running 'Task2.cpp':

```
sh:\Desktop\Abdul Moiz Mansab.44647> cd
"c:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647\" ; if ($?) { g++ Tas
k2.cpp -o Task2 } ; if ($?) { .\Task2 }
Enter search value:
45
Search not found
PS C:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647>
```

TASK # 3

Code

The screenshot shows the Visual Studio Code editor with the file `Task3.cpp` open. The code defines an array and prints its elements. The output window shows the execution results.

```
1 #include<iostream>
2 using namespace std;
3
4 int main() {
5     int array[] = {22, 34, 25, 32, 55};
6     array[4]=100;
7     for(int i=0; i<5; i++)
8     {
9         cout<<array[i]<<" ";
10    }
11
12
13    return 0;
14 }
```

```
shih\Desktop\Abdul Moiz Mansab.44647> cd
"c:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647\" ; if ($?) { g++ Tas
k3.cpp -o Task3 } ; if ($?) { .\Task3 }

22 34 25 32 100
PS C:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647>
```

TASK # 4

Code

The screenshot shows the Visual Studio Code editor with the file `Task4.cpp` open. The code defines an array, updates its values, and prints the elements. The output window shows the execution results.

```
1 #include<iostream>
2 using namespace std;
3
4 int main() {
5     int value[] = {22, 34, 25, 32, 55};
6     value[3]=value[4];
7     value[4]=value[5];
8     for(int i=0; (i+1)<5; i++)
9     {
10        cout<<value[i]<<" ";
11    }
12
13
14    return 0;
15 }
```

```
shih\Desktop\Abdul Moiz Mansab.44647> cd
"c:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647\" ; if ($?) { g++ Tas
k4.cpp -o Task4 } ; if ($?) { .\Task4 }

22 34 25 55
PS C:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647>
```

TASK # 5

Code

```
1 #include <iostream>
2 using namespace std;
3
4
5 int main() {
6     const int number=6;
7     int arr[number];
8     cout << "Enter 6 integer values:<<endl;
9     for (int i=0; i<number; i++)
10     {
11         cin>>arr[i];
12     }
13     bool isPalindrome=true;
14     for (int i=0; i<number /2; i++) {
15         if (arr[i]!= arr[number-1-i]) {
16             isPalindrome = false;
17             break;
18         }
19     }
20     if (isPalindrome) {
21         cout << "The array is a palindrome" << endl;
22     } else {
23         cout << "The array is not a palindrome" << endl;
24     }
25     return 0;
26 }
```

```
shih\Desktop\Abdul Moiz Mansab.44647> cd
"c:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647\" ; if ($?) { g++ Tas
k5.cpp -o Task5 } ; if ($?) { .\Task5 }

Enter 6 integer values:
1
2
3
4
5
6
The array is not a palindrome
PS C:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647>
```

TASK # 6

Code

```
1 #include <iostream>
2 using namespace std;
3 int factorial(int n) {
4     int result = 1;
5     for (int i = 1; i <= n; i++) {
6         result *= i;
7     }
8     return result;
9 }
10
11 int main() {
12     int size;
13     cout<<"Enter the size of the array (1 to 5): ";
14     cin>>size;
15     while(size <1|| size >5)
16     {
17         cout<<"Invalid size! Please enter a size between 1 and 5: ";
18         cin>>size;
19     }
20     int arr[5];
21     int sum=0;
22     for (int i=0; i<size; i++)
23     {
24         cout<<"Enter element "<<i+1<<" (0 to 5): ";
25         cin>>arr[i];
26     }
27     while (arr[i]<0 || arr[i]>5)
28     {
29         cout<<"Invalid input! Please enter a number between 0 and 5: ";
30         cin>>arr[i];
31     }
32     sum+=arr[i];
```

```
shih\Desktop\Abdul Moiz Mansab.44647> cd
"c:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647\" ; if ($?) { g++ Tas
k6.cpp -o Task6 } ; if ($?) { .\Task6 }

Enter the size of the array (1 to 5): 3

Enter element 1 (0 to 5): 1
Enter element 2 (0 to 5): 2
Enter element 3 (0 to 5): 3
Average of the elements: 2
Factorials of the elements: 1 2 6

PS C:\Users\Aimen Qureshi\Desktop\Abdul
Moiz Mansab.44647>
```

TASK # 7

Code

The screenshot shows the Visual Studio Code interface with a C++ file named `TASK7.cpp` open. The code implements a linear search algorithm. It prompts the user to enter the size of the array, then the elements of the array, and finally the key value to search for. It then iterates through the array to find the key value and prints the index if found, or a message if not found.

```
3 using namespace std;
4
5 int main() {
6     int size, key;
7     cout<<"Enter the size of the array: ";
8     cin>>size;
9
10    vector<int> arr(size);
11    cout<<"Enter the elements of the array: ";
12    for (int i=0; i<size; i++)
13    {
14        cin>>arr[i];
15    }
16    cout<<"Enter the key value to search: ";
17    cin>>key;
18    bool found=false;
19    for (int i=0; i<size; i++)
20    {
21        if (arr[i]==key) {
22            cout<<"Key value found at index: "<<i<<endl;
23            found=true;
24        }
25        if (!found)
26        {
27            cout<<"Key value not found in the array."<<endl;
28        }
29    }
30
31    return 0;
32 }
```

The terminal output on the right shows the execution of the program:

```
sh: Desktop\Abdul Moiz Mansab.44647> cd
"C:\Users\Aimen Qureshi\Desktop\Abdul Moiz Mansab.44647\" ; if ($?) { g++ TASK7.cpp -o TASK7 } ; if ($?) { .\TASK7 }

Enter the size of the array: 4
Enter the elements of the array: 1
2
3
4
Enter the key value to search: 2
Key value found at index: 1
PS C:\Users\Aimen Qureshi\Desktop\Abdul Moiz Mansab.44647>
```

TASK # 8

Code

The screenshot shows the Visual Studio Code interface with a C++ file named `TASK8.cpp` open. The code implements a search algorithm for a 4x4 matrix. It prompts the user to enter the elements of the 4x4 matrix, then the value to be searched for. It then iterates through the matrix to find the value and prints the row and column if found, or a message if not found.

```
1 #include <iostream>
2
3 using namespace std;
4
5 int main() {
6     int matrix[4][4], searchValue, found = 0;
7     cout << "Enter elements of the 4x4 matrix:\n";
8     for (int i = 0; i < 4; i++) {
9         for (int j = 0; j < 4; j++) {
10             cin >> matrix[i][j];
11         }
12     }
13     cout << "Enter the value to be searched: ";
14     cin >> searchValue;
15     for (int i = 0; i < 4; i++) {
16         for (int j = 0; j < 4; j++) {
17             if (matrix[i][j] == searchValue)
18             {
19                 found = 1;
20                 cout << "Value found at row " << i + 1 << ", column " << j + 1 << endl;
21                 break;
22             }
23         }
24         if (found) {
25             break;
26         }
27     }
28
29     if (!found)
30     {
31         cout << "Value not found in the matrix." << endl;
32     }
33 }
```

The terminal output on the right shows the execution of the program:

```
sh: Desktop\Abdul Moiz Mansab.44647> cd
"C:\Users\Aimen Qureshi\Desktop\Abdul Moiz Mansab.44647\" ; if ($?) { g++ TASK8.cpp -o TASK8 } ; if ($?) { .\TASK8 }

Enter elements of the 4x4 matrix:
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Enter the value to be searched: 8
Value found at row 2, column 4
PS C:\Users\Aimen Qureshi\Desktop\Abdul Moiz Mansab.44647>
```

TASK # 9

Code

