Problem 1

```
Vishruths-MacBook-Pro:Project3 vi
"/Users/vish/Desktop/Algorithm De
 1 2 1 2 1 2
 1 2 1 2 1 3
 1 2 1 2 3 2
 1 2 1 3 1 2
 1 2 1 3 1 3
 1 2 3 2 1 2
 1 2 3 2 3 1
 1 2 3 2 3 2
 1 2 3 3 1 2
 1 3 1 2 1 2
 1 3 1 2 1 3
 1 3 1 3 1 2
 1 3 1 3 1 3
 1 3 1 3 2 3
 1 3 2 2 1 3
 1 3 2 3 1 3
 1 3 2 3 2 1
 1 3 2 3 2 3
 2 1 2 1 2 1
 2 1 2 1 2 3
 2 1 2 1 3 1
 2 1 2 3 2 1
 2 1 2 3 2 3
 2 1 3 1 2 1
 2 1 3 1 3 1
 2 1 3 1 3 2
 2 1 3 3 2 1
 2 3 1 1 2 3
 2 3 1 3 1 2
 2 3 1 3 1 3
 2 3 1 3 2 3
 2 3 2 1 2 1
 2 3 2 1 2 3
 2 3 2 3 1 3
 2 3 2 3 2 1
 2 3 2 3 2 3
 3 1 2 1 2 1
 3 1 2 1 2 3
 3 1 2 1 3 1
 3 1 2 2 3 1
 3 1 3 1 2 1
 3 1 3 1 3 1
 3 1 3 1 3 2
 3 1 3 2 3 1
 3 1 3 2 3 2
 3 2 1 1 3 2
 3 2 1 2 1 2
 3 2 1 2 1 3
 3 2 1 2 3 2
 3 2 3 1 3 1
 3 2 3 1 3 2
 3 2 3 2 1 2
 3 2 3 2 3 1
 3 2 3 2 3 2
Total number of solutions: 54

1 corresponds to Red
2 corresponds to Blue
3 corresponds to Greeen
```

Problem 2

```
Vishruths-MacBook-Pro:Project3 vish$ cd "/Users/vish/Desktop/Algorithm Design/Project3/" && g++ Problem2.cpp -o Problem2 &&
"/Users/vish/Desktop/Algorithm Design/Project3/"Problem2

Max Profit: 55
Vishruths-MacBook-Pro:Project3 vish$
```

Problem 3

```
Vishruths-MacBook-Pro:Project3 vish$ cd "/Users/vish/Desktop
"/Users/vish/Desktop/Algorithm Design/Project3/"Problem3
Enter the number of vertices of graphs 1 and 2:
5 5
Enter the number of edges:
7 7
Enter the source and destination vertices of G1:
0 1
0 3
1 4
1 3
1 2
2 3
4 2
Enter the source and destination vertices of G2:
0 1
0 3
1 3
3 4
2 4
2 3
0 4
1 3 4 0 2
Graphs are Isomorphic.
Vishruths-MacBook-Pro:Project3 vish$
```

```
Vishruths-MacBook-Pro:Project3 vish$ cd "/Users/vish/Desktop/
"/Users/vish/Desktop/Algorithm Design/Project3/"Problem3
Enter the number of vertices of graphs 1 and 2:
6 6
Enter the number of edges:
9 9
Enter the source and destination vertices of G1:
0 1
0 2
0 4
1 2
1 5
2 3
3 4
3 5
4 5
Enter the source and destination vertices of G2:
0 1
0 3
0 4
1 2
1 5
2 3
2 4
3 5
4 5
Graphs are not isomorphic.
Vishruths-MacBook-Pro:Project3 vish$
```

```
Vishruths-MacBook-Pro:Project3 vish$ cd "/Users/vish/Desktop
"/Users/vish/Desktop/Algorithm Design/Project3/"Problem3
Enter the number of vertices of graphs 1 and 2:
7 7
Enter the number of edges:
11 11
Enter the source and destination vertices of G1:
0 1
0 3
0 4
1 2
1 4
2 3
2 5
3 6
4 5
5 6
4 6
Enter the source and destination vertices of G2:
0 1
1 2
2 3
3 0
2 5
4 6
4 5
5 6
3 6
4 1
0 5
Graphs are not isomorphic.
Vishruths-MacBook-Pro:Project3 vish$
```

Time Complexity for Problem 3:
Consider the following program segment:

```
for i in range(n2):
        flag = 0
        for j in range(x):
            if map[j] == i:
                flag = 1
```

The above loop has a Time complexity: O(n^2)

```
 if isomorphic(x + 1, map):
```

In this part of the code we are recursively calling the isomorphic function. With every recursive call the value of x is increasing by 1 so the number of elements is decreasing by 1.

Hence the recurrence relation can be written as
Time complexity: O(n^2) + n * T(n-1) = O(n!)

Source for Problem 3:
I didn't refer to any online source. I used the same logic as we used for the n-queens problem.