North South University
Department of Electrical and Computer Engineering
CSE 225L: Data Structures and Algorithms
Section 1
Spring 2020
End of Semester Assignment
Due: 4^{th} June 2020 via Google classroom

Instructor: Dr. Sifat Momen

There are altogether of **1** question comprising of a total of **20** marks. This assignment has a total of 2 pages. **You should submit all your code in a single pdf file**.

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1. (20 points) Graph coloring is an assignment of colors or any distinct marks to the vertices of the graph. The colors should be assigned in such a way so that no two adjacent vertices have the same color. Figure 1 shows an example of a graph that has been colored correctly. Coloring

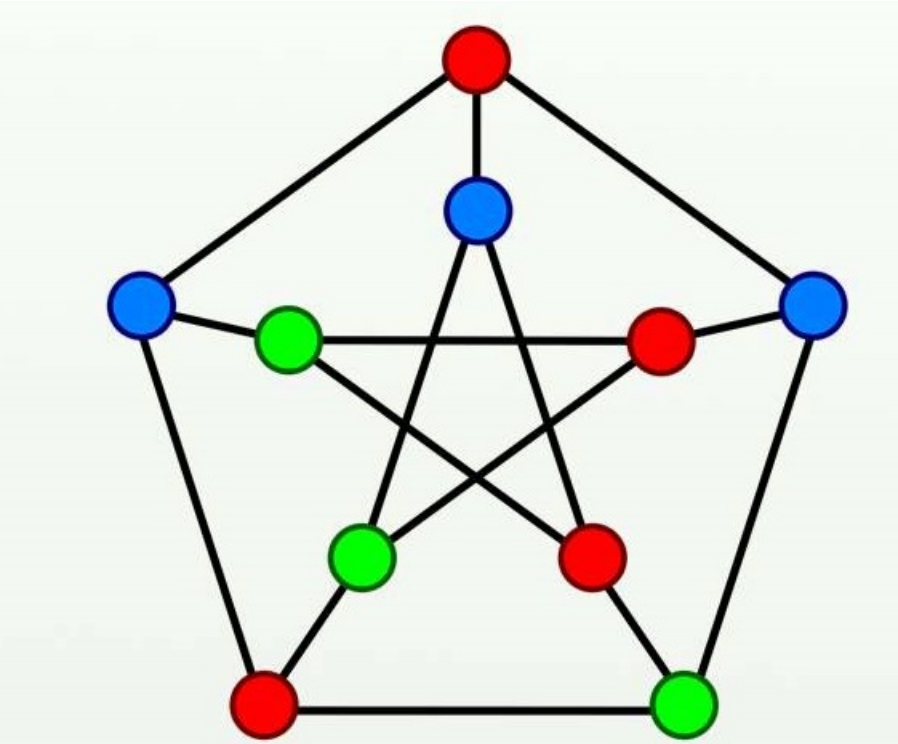

Figure 1: Example of a colored graph

graphs with minimum number of colors is a challenging problem in Computer Science. This problem has many practical applications.

The following is an algorithm that provides a near-optimal coloring of vertices such that no two adjacent vertices in a given graph has the same color.

Algorithm 1: Algorithm for graph coloring

1. Order the nodes $V_1, V_2, ..., V_n$
2. Order the colors $C_1, C_2, ..., C_m$
3. **for** *i = 1, 2, ..., n* **do**
   | 3.1 Assign the lowest color to v_i

end

You are required to implement the algorithm stated in algorithm 1 for the graph in figure 2.

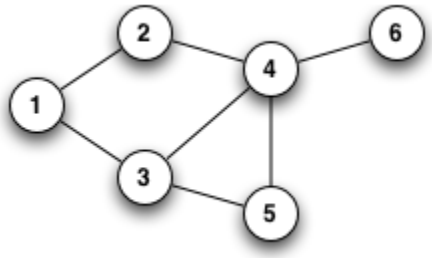

Figure 2: An undirected graph

You must implement the algorithm in C/C++ and you should use the graph data structure we have built in the class. You are free to make any changes in the data structure we built in the class if you feel it necessary. You should also print out the colors your program has assigned for each vertex.