CS302 - Data Structures
using C++

Topic: Graph Coloring

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Graph Coloring Problem

- Let G be undirected graph and let c be an integer.

- Assignment of colors to the vertices or edges such that no two adjacent vertices are to be similarly colored.

- We want to minimize the number of colors used.

- The smallest c such that a c-coloring exists is called the graph's chromatic number and any such c-coloring is an optimal coloring.

Coloring of a Graph

- The graph coloring optimization problem: find the minimum number of colors needed to color a graph.

- The graph coloring decision problem: determine if there exists a coloring for a given graph which uses at most m colors.
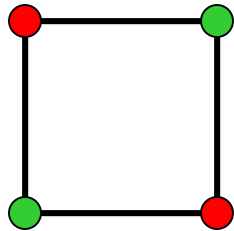
Two colors
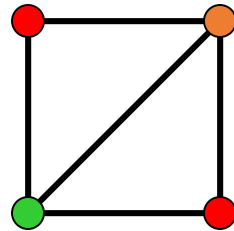
No solution with two colors

Coloring of a Graph

- Practical applications: scheduling, time-tabling, register allocation for compilers, coloring of maps.

- A simple graph coloring algorithm - choose a color and an arbitrary starting vertex and color all the vertices that can be colored with that color.

- Choose next starting vertex and next color and repeat the coloring until all the vertices are colored.
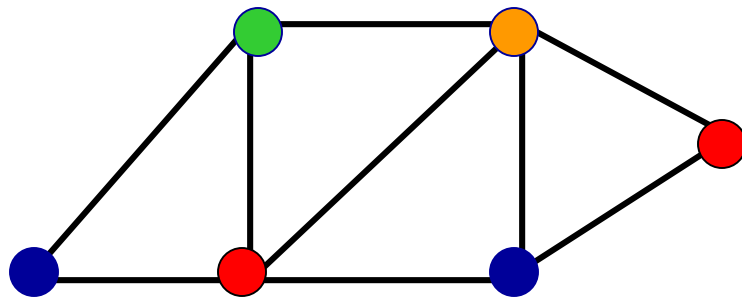
Four colors
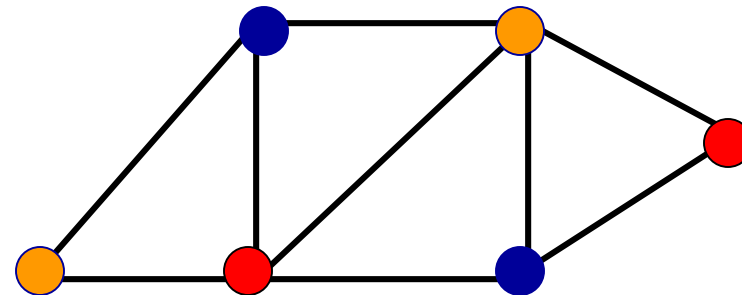
Three colors are enough

Thank you