

Graph coloring:

Graph coloring is a special case of graph labeling. It is an assignment of labels traditionally called "colors" to elements of a graph subject to certain constraints. In this simplest form, it is a way of coloring assigns a color to each edge so that no two adjacent edges share the same color.

Definition:

When used without any qualification, a coloring of a graph is almost always a proper vertex coloring, namely a labeling of the graph's vertices with colors such that no two vertices sharing the same edge have the same color.

Implementation of graph coloring:

1.

The proper coloring which is of interest to us one that requires the minimum number of colors. A graph G that requires k different colors for its proper coloring and no less, is called a k -chromatic graph and the number k is called chromatic number.

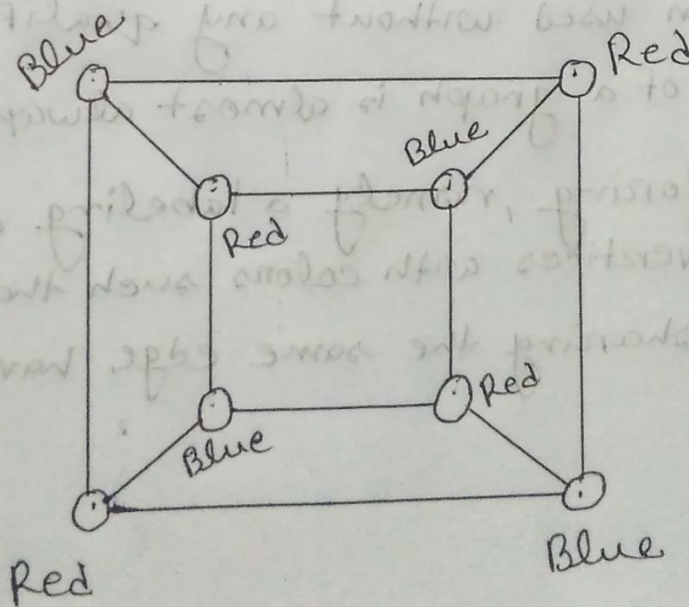


Fig: 1

The chromatic number of this graph is 2 and a graph with at least one edge is 2 chromatic if and only if it has no circuit of odd length.

Some observation:

1. A graph consisting of only isolated vertices is 1 chromatic.

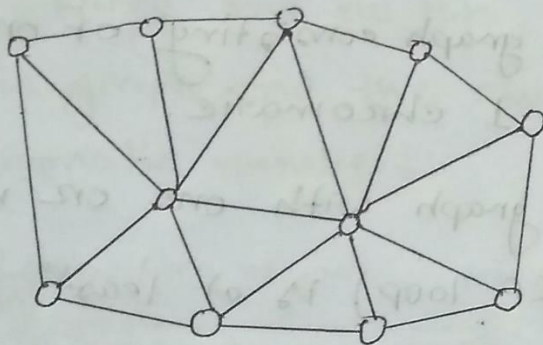
2. A graph with one or more edges (not a self loop) is at least two chromatic (also called bichromatic)

3. A graph consisting of simply one circuit with $n \geq 3$ vertices is 2-chromatic if n is even and 3 chromatic if n is odd.

2. Map coloring:

— A map is a two dimensional drawing with regions to be colored.

Here we represent the map using a graph:



- each circle represent a country
- countries which share a common border on the map are connected by lines called edge.

rules of map coloring:

- Regions which share a border must be colored different colors.

- Regions which touch at only one point a time may be colored the same color.

- we must use the least amount of colors possible:

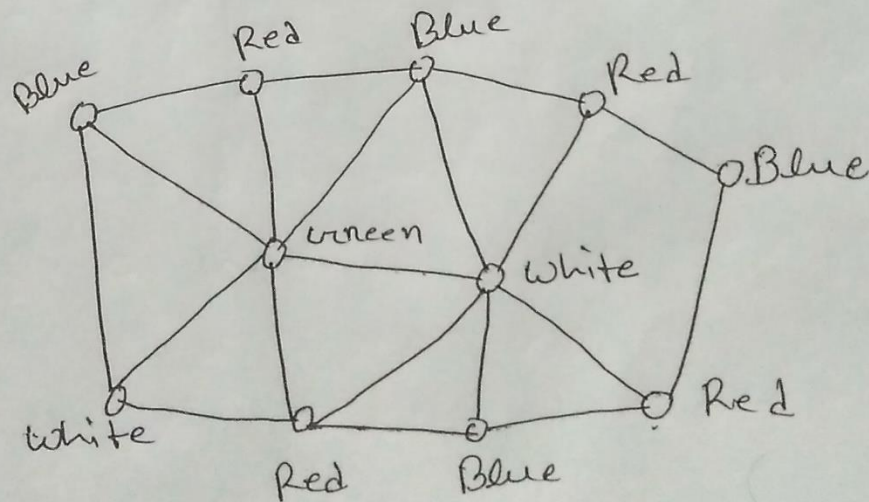


fig: map coloring