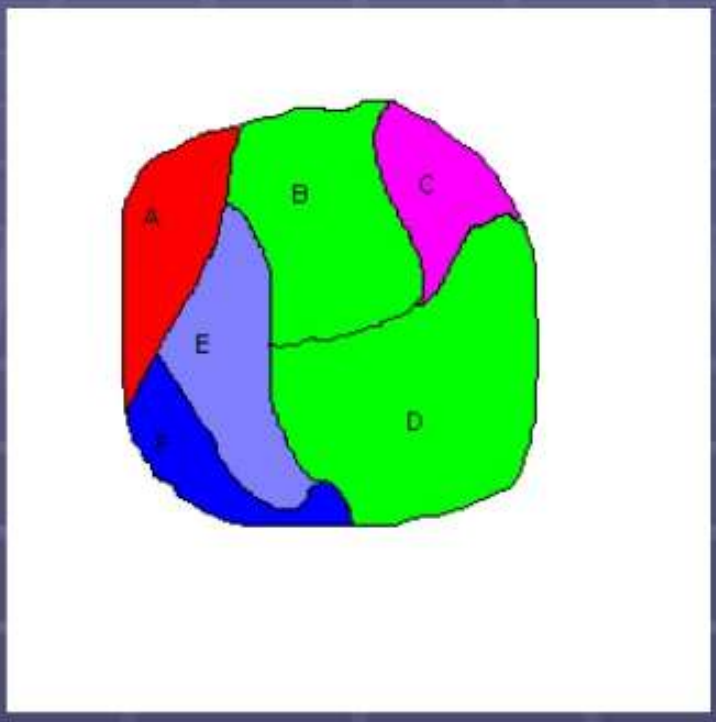
What is Graph Coloring?

- Graph Coloring is an assignment of colors (or any distinct marks) to the vertices of a graph. Strictly speaking, a coloring is a proper coloring if no two adjacent vertices have the same color.

Origin of the problem



Why Graph Coloring?

- Many problems can be formulated as a graph coloring problem including Time Tabling, Channel Assignment etc.
- A lot of research has been done in this area.

Channel Assignment

- Find a channel assignment to R radio stations such that no station has a conflict (there is a conflict if they are in vicinity)
- Vertices – radio stations, edges – conflict, colors – available channels

Terminology

- K-Coloring
  - A k-coloring of a graph G is a mapping of V(G) onto the integers 1..k such that adjacent vertices map into different integers.
  - A k-coloring partitions V(G) into k disjoint subsets such that vertices from different subsets have different colors.

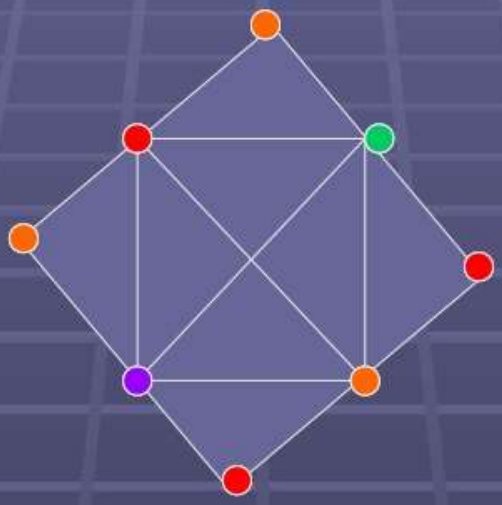
Terminology

- K-colorable
  - A graph G is k-colorable if it has a k-coloring.
- Chromatic Number
  - The smallest integer k for which G is k-colorable is called the chromatic number of G.

Terminology

- K-chromatic graph
  - A graph whose chromatic number is k is called a k-chromatic graph.
- Coloring
  - A coloring of a graph G assigns colors to the vertices of G so that adjacent vertices are given different colors

Example



The chromatic number is four. Therefore this a 4-Chromatic Graph