EXPERIMENT 10

Objective: Implementation of face coloring algorithms in planar graphs.

Brief Theory:

Face coloring involves assigning colors to the faces of a planar graph such that no two adjacent faces share the same color. Two faces are considered adjacent if they share a common edge.

Key Concepts:

1. Planar Graph: A graph that can be drawn on a plane without edges crossing.
2. Face: A region bounded by edges in the planar embedding of the graph, including the outer (unbounded) region.

Algorithm for Face Coloring:

1. Planar Embedding: Draw the graph in the plane to identify faces.
2. Dual Graph Transformation: Convert the planar graph into its dual graph, where:
   o Each face in the planar graph becomes a vertex in the dual graph.
   o An edge exists between two vertices in the dual graph if their corresponding faces in the planar graph are adjacent.
3. Vertex Coloring of the Dual Graph:
   o Apply a vertex coloring algorithm (e.g., greedy coloring) to the dual graph to ensure no two adjacent vertices share the same color.
   o The resulting colors correspond to the face colors of the original graph.

Task:

1) Write a program to input the given graph and represent its planar embedding by identifying its faces.

2) Create a program to visualize the planar graph and display the colored faces based on the greedy face coloring algorithm.
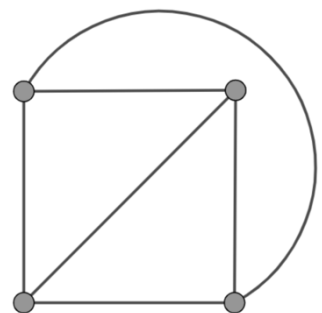
Apparatus and components required: Computer with C or C++ Compiler and Linux/Windows platform.

Experimental/numerical procedure: Coding, compilation, editing, run and debugging.