TASK:6

Solve a **Map Coloring problem** using constraint satisfaction approach by applying following constraints

Aim: To Solve a Map Coloring problem using constraint satisfaction approach using Graphonline and visualago online simulator

Algorithm:

Step 1: Confirm whether it is valid to color the current vertex worth the current color (by checking whether any of its adjacent vertices are colored with the same color)

Step 2: If yes then color it and otherwise try a different color

Step 3: check if all vertices are colored or not

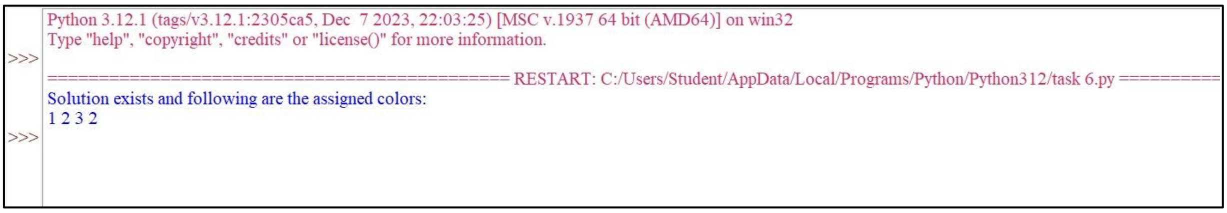
Step 4: If not then move to the next adjacent uncolored vertex

Step 5: Here backtracking means to stop further recursive calls on adjacent vertices.

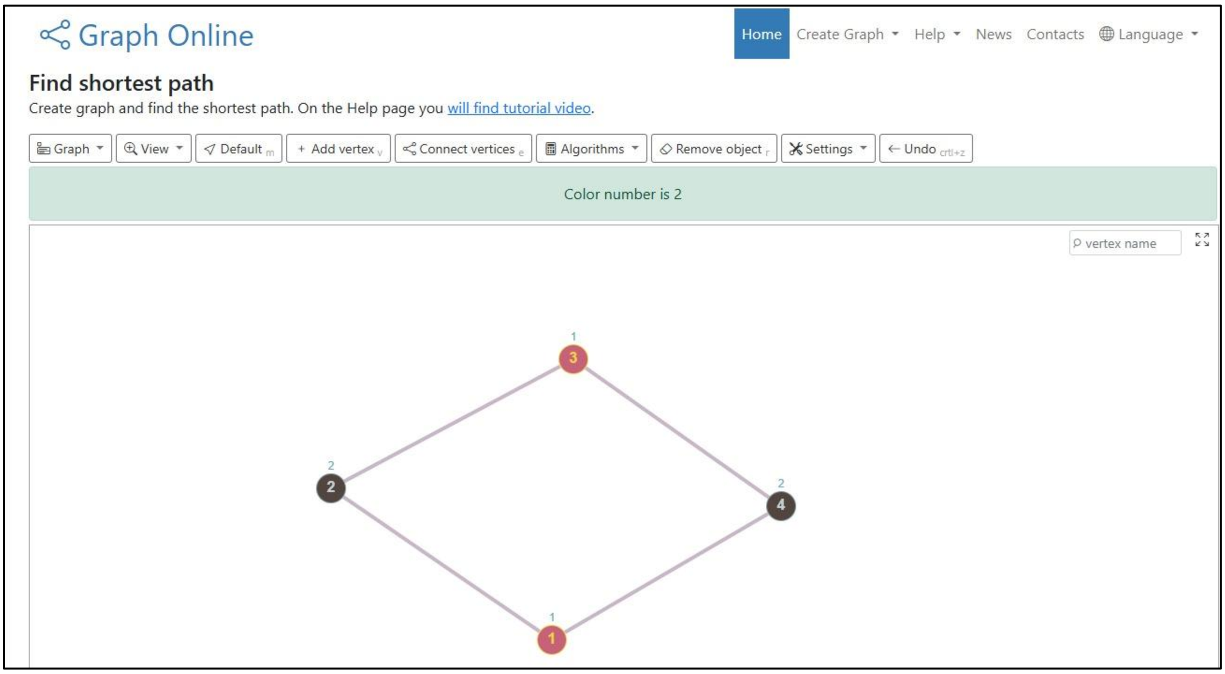
Program: class

```
Graph:
    def _init_(self, vertices):
        self.v = vertices self.graph = [[0 for column in range(vertices)] for row in
        range(vertices)]

    # A utility function to check if the current color assignment is safe for vertex v def
    is_safe(self, v, color, c):
        for i in range(self.v):
            if self.graph[v][i] == 1 and color[i] == c:
                return False
        return True
    # A recursive utility function to solve m-coloring problem def
    graph_color_util(self, m, color, v):
        if v == self.v: return
            True

        for c in range(1, m+1):
            if self.is_safe(v, color, c):
                color[v] = c
                if self.graph_color_util(m, color, v+1):
                    return True
                color[v] = 0
    def graph_coloring(self, m):
        color     =     [0]     *     self.v     if     not
        self.graph_color_util(m,      color,      0):
        return False

        # Print the solution print("Solution exists and following are
        the assigned colors:") for c in color: print(c, end=" ")

# Driver Code if _name_==
'_main_':
    g = Graph(4)
    g.graph = [[0, 1, 1, 1], [1, 0, 1, 0], [1, 1, 0, 1], [1, 0, 1,
    0]] m = 3 # Function call
    g.graph_coloring(m)
```

Output:



```
    Python 3.12.1 (tags/v3.12.1:2305ca5, Dec  7 2023, 22:03:25) [MSC v.1937 64 bit (AMD64)] on win32
    Type "help", "copyright", "credits" or "license()" for more information.
>>>
    ============================================== RESTART: C:/Users/Student/AppData/Local/Programs/Python/Python312/task 6.py ==========
    Solution exists and following are the assigned colors:
    1 2 3 2
>>>
```



Find shortest path

Create graph and find the shortest path. On the Help page you will find tutorial video.

Color number is 2

Result:

Thus Solving a Map Coloring problem using constraint satisfaction approach using Graphonline and visulago online simulator was successfully executed and output was verified.