

Problem 4: Given an undirected graph and a number m , determine if the graph can be colored with at most m colors such that no two adjacent vertices of the graph are colored with the same color.

```
def graphColoringUtil(graph, m, colors, v):  
    if v == len(graph):  
        return True  
    for c in range(1, m + 1):  
        if isSafe(graph, colors, v, c):  
            colors[v] = c  
            if graphColoringUtil(graph, m, colors, v + 1):  
                return True  
            colors[v] = -1  
  
    return False
```

```
def isSafe(graph, colors, v, c):  
    for u in graph[v]:  
        if colors[u] == c:  
            return False  
    return True
```

```
def graphColoring(N, M, Edges):  
    graph = [[] for _ in range(N)]  
    for u, v in Edges:  
        graph[u].append(v)  
        graph[v].append(u)  
  
    colors = [-1] * N  
    if graphColoringUtil(graph, M, colors, 0):  
        return 1  
    return 0
```

$N = 4$

M = 3

Edges = [(0, 1), (1, 2), (2, 3), (3, 0), (0, 2)]

print(graphColoring(N, M, Edges))

A screenshot of a terminal window. The title bar at the top is dark grey with the number '36' on the left. Below the title bar is a light grey bar with the word 'input' in the center. The main area of the terminal is black with green text. The text reads: '1' on the first line, followed by '...Program finished with exit code 0' on the second line, and 'Press ENTER to exit console.' on the third line, with a small white cursor box at the end of the last line. On the left side of the terminal window, there is a vertical blue bar with some text partially visible: 'ms', 'DB', and 'cy'.