

Lab Test–1

Computer Systems

November 12, 2020

Date: November 12, 2020

Time: 2:30 P.M. – 5:30 P.M.

Given an undirected, unweighted graph $G = (V, E)$ with each vertex is colored with either red or blue, write a C/C++ program that prints three types of cycles, namely (i) red cycles, (ii) blue cycles, and (iii) red-blue cycles, if exist in G .

The red cycles consist of the red vertices V_R only. The blue cycles consist of the blue vertices V_B only. The red-blue cycles consist of vertices of both the colors. Note that we can have three types of edges in G . The set E_{RR} represents the edges between red vertices (red edges), the set E_{BB} represents the edges between blue vertices (blue edges), and the set E_{RB} represents the edges with an edge between a red vertex and a blue vertex (green edges). That is, $V = V_R \cup V_B$, and $E = E_{RR} \cup E_{BB} \cup E_{RB}$.

Print all the cycles while encountering a back edge. Note that it may not print all the cycles.

Input: 7

r b r b r r b

0 4

0 5

3 1

1 6

6 0

3 6

2 3

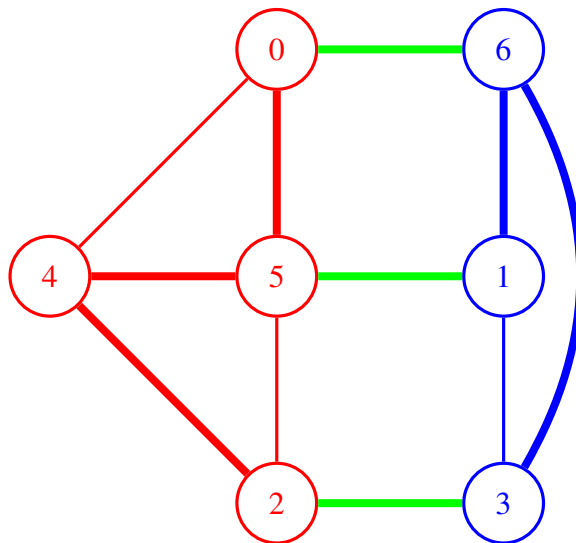
2 5

5 4

4 2

1 5

-1



Output:

Graph Adjacency List

[r] 0 → 6 → 5 → 4

[b] 1 → 5 → 6 → 3

[r] 2 → 4 → 5 → 3

[b] 3 → 2 → 6 → 1

[r] 4 → 2 → 5 → 0

[r] 5 → 1 → 4 → 2 → 0

$[b] 6 \rightarrow 3 \rightarrow 0 \rightarrow 1$

Red Adjacency List

$[r] 0 \rightarrow 5 \rightarrow 4$

$[r] 2 \rightarrow 4 \rightarrow 5$

$[r] 4 \rightarrow 2 \rightarrow 5 \rightarrow 0$

$[r] 5 \rightarrow 4 \rightarrow 2 \rightarrow 0$

Blue Adjacency List

$[b] 1 \rightarrow 6 \rightarrow 3$

$[b] 3 \rightarrow 6 \rightarrow 1$

$[b] 6 \rightarrow 3 \rightarrow 1$

Red Cycles

$5[r] 4[r] 2[r]$

$0[r] 5[r] 4[r]$

Blue Cycles

$1[b] 6[b] 3[b]$

Red-Blue Adjacency List

$[r] 0 \rightarrow 6 \rightarrow 5$

$[b] 1 \rightarrow 5 \rightarrow 6$

$[r] 2 \rightarrow 4 \rightarrow 3$

$[b] 3 \rightarrow 2 \rightarrow 6$

$[r] 4 \rightarrow 2 \rightarrow 5$

$[r] 5 \rightarrow 1 \rightarrow 4 \rightarrow 0$

$[b] 6 \rightarrow 3 \rightarrow 0 \rightarrow 1$

Red-Blue Cycles

$6[b] 3[b] 2[r] 4[r] 5[r] 1[b]$

$0[r] 6[b] 3[b] 2[r] 4[r] 5[r]$

Submission Instruction:

File Name: LT1_RollNo.c/cpp

Email to: joy@iitbbs.ac.in with **subject line:** LT1_RollNo