Djilali Bounaâma University, Khemis Miliana

Faculty of Matter Sciences and Computer Science

Computer Science Department

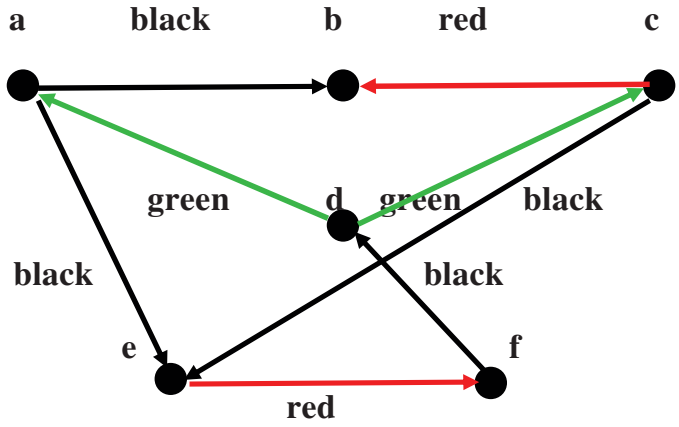
2nd Year Computer Science

Module: Graph Theory

Tutorial Session (5)

Exercise 1:

Let **G** the following graph:



1. Decompose the cycle **(a , d , c , e , f , d , a)** into elementary cycles.
2. Decompose the cocycle $\omega(\{a,d,f\})$ into elementary cocycles.
3. Determine whether the arc **(a , b)**, colored in black, belongs to an elementary circuit or to an elementary cocircuit.
4. Calculate the cyclomatic number $\nu(G)$.
5. How many edges must be removed from graph **G** to transform it into a tree?
6. Give the spanning tree **T** of **G**.
7. Give the cotree **T*** associated with **T**.
8. Give a cycle basis for the graph **G**.

9. Give the vectors associated with each cycle of the basis.

10. Calculate the cocyclomatic number $\lambda(\mathbf{G})$.

11. Give a cocycle basis for the graph **G**.

12. Give the vectors associated with each cocycle of the basis.

Exercise 2:

Show that the multigraphs $\mathbf{K}_{3,3}$ and $\mathbf{K}_5$ are not planar.

Exercise 3:

Represent the arithmetic expression $(\mathbf{e}^{\mathbf{x}} - \mathbf{y}) * (\mathbf{c} + \mathbf{d} / \mathbf{z}) + 4$ in the form of a tree, respecting the rules of operator precedence.