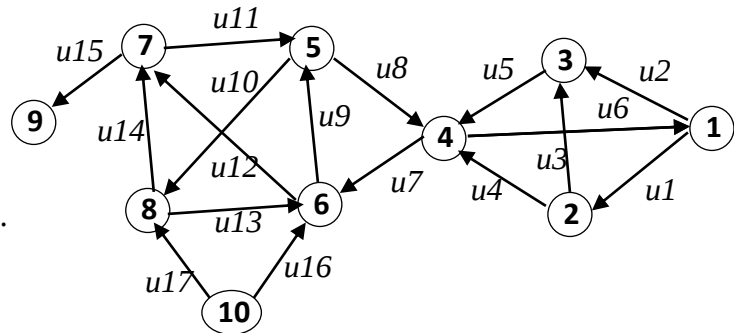


TUTORIALS - SERIES NO. 01

Exercise 01

Let the following graph $G(X, U)$:



1. Give the order and size of the graph G .
2. Represent the graph using:
 - a) An adjacency matrix
 - b) An incidence matrix
3. Find: $\Gamma^+(6)$, $\Gamma^-(4)$, $\Gamma(5)$.
4. Find: $d^+(8)$, $d^-(2)$, $d(6)$.
5. Find: $I_+(4)$, $I(6)$, $I(8)$.
6. Find a path between vertices 4 and 6, is it simple? Is it elementary?
7. Give a simply connected component
8. Give a strongly connected component

Remove the orientation of the graph and calculate:

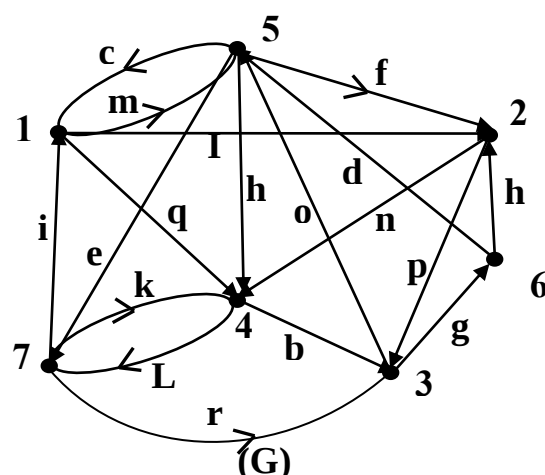
1. The density D of the graph G
2. Give a community of vertices
3. Is there a bridge? Determine the?

Exercise 02

Let the following graph $G(X, U)$:

With: $X = \{1, 2, 3, 4, 5, 6, 7\}$

$U = \{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r\}$



- 1 - Among the n-uples below specify: paths, simple paths, elementary paths :
 (g, d, f, i), (h, b, e, j), (b, g, d, c, m, e, k, b, g, a), (i, q, b, g, d, c, j), (m, f, n, l, r, g).
- 2 - The two paths (1, 5, 2, 4, 7, 3, 6) and (m, f, n, l, r, g) are they the same?
- 3 - The path (1, 5, 2, 3, 6, 5, 4, 7, 3, 5, 7, 1) is it a circuit? is it simple? is it elementary?
- 4 - The same previous question for the paths (1, 5, 2, 3, 5, 4, 7, 1), (5, 2, 3, 4, 7, 1, 5)
- 5 - What is the type of path? (i, m, h, b, g, a)?
- 6 - Express the previous path by a sequence of vertices.

Exercise 03

Let $G(X, U)$ be a directed graph

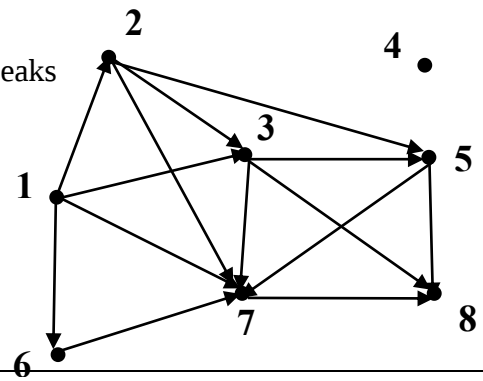
1 – Determine a source vertex, a sink vertex, and an isolated peaks

2 - Calculate $d^+(4)$, $\Gamma(4)$, $d(1)$, $\Gamma(1)$, $d^-(6)$, $\Gamma^+(1)$, $\Gamma^-(7)$, $d(3)$

3 – Give the order and size of the graph G .

4 – Give a simple path between 1 and 8

5 – Give a chain between 2 and 7.

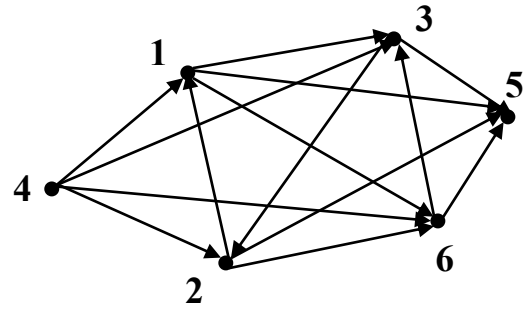


Exercise 04

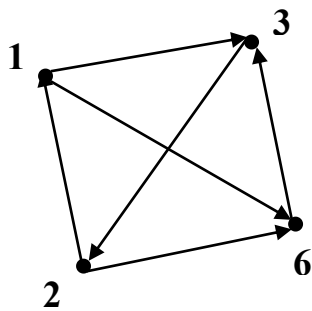
Let the following graph $G(X, U)$:

With: $X = \{1, 2, 3, 4, 5, 6\}$

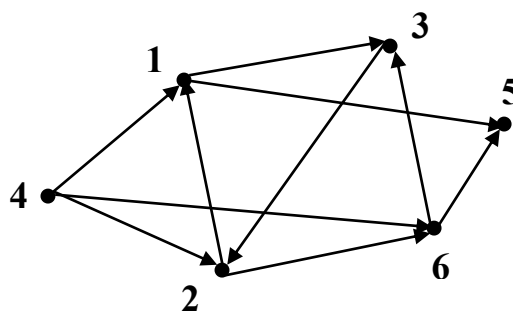
$U = \{(4,1), (4,2), (4,3), (4,6), (2,1), (2,6), (2,5), (1,3), (1,5), (1,6), (3,2), (3,5), (6,5), (6,3)\}$



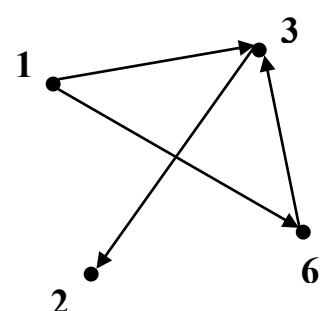
Specify which of the following graphs is : a subgraph, a partial graph, a partial subgraph?



(G1)



(G2)



(G3)

Good luck