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Faculty of Mathematics and Computer Science

Department: Computer Science

Module:Graph Theory/L2-LMD

TUTORIALS - SERIES NO. 03

EXERCISE N° 01

The characteristics of each of the given graphs (main characteristics):

(a) Is a symmetric graph, but it is not complete, and is not a simple graph

(b) Is not symmetrical, is not antisymmetrical, is not simple

(c) Is not reflexive, is not symmetric, is not simple, is not antisymmetric

(d) Is a simple, antisymmetric, transitive graph, is not reflexive.

(e) A bipartite graph

(f) A reflexive graph

(g) A trivial graph

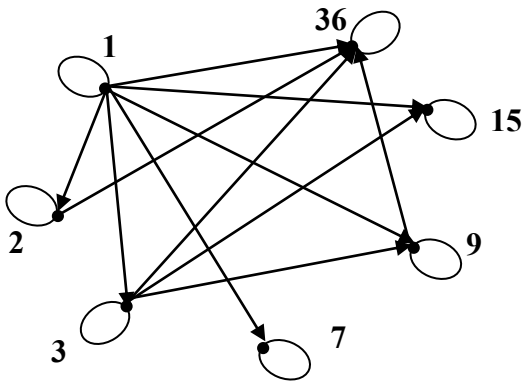
(h) /(c) : (h) is the inverse graph of graph (c)

(i) /(b): (i) is the complementary graph of graph (b)

EXERCISE N° 02

G(X, U) a graph, such that: X= {1, 2, 3, 7, 9, 15, 36} U = { (x, y) / (x, y) ∈U si x divise y}

1. Representation of the graph G.



2. Characteristics of G
   - Reflexive
   - Antisymmetric
   - Transitive

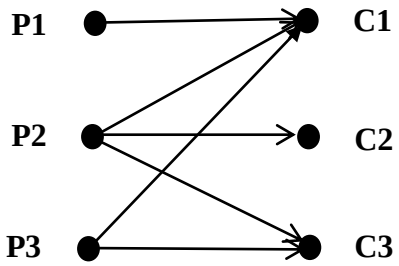
3. The divisibility relation “divide”

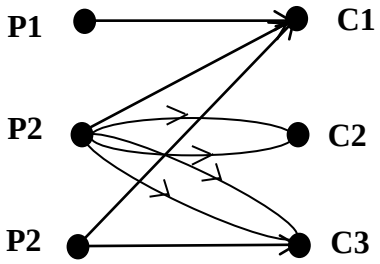
   Is a relation: reflexive, antisymmetric, transitive ==> is an order relation

4. There are no circuits in G

EXERCISE N° 03

Modeling the problem of teachers P1, P2, P3 and classes C1, C2 and C3.



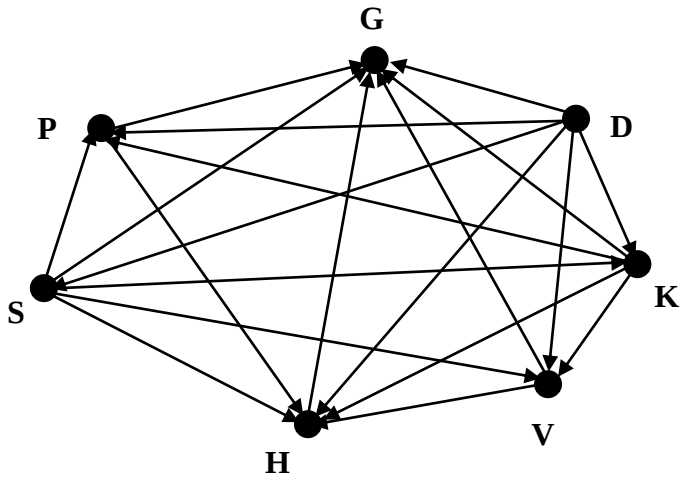


EXERCISE N° 04

The administration council of a company is composed of seven (07) members: Mrs. G, H, K, S, V and Ms D and P. Each of these people influences a certain number of their colleagues as shown in the table below:

Mr or Mrs	Influence
D	G, H, K, P, S, V
G	None
H	G
K	G, H, P, V
P	G, H
S	G, H, K, P, V
V	G, H

1. Representation of the influence game within this council using a graph



Influence graph G

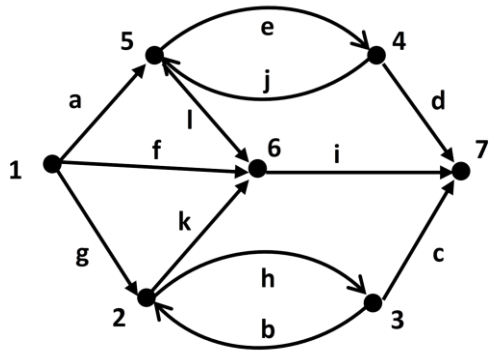
2. Give the adjacency matrix of the resulting graph.

	G	H	K	S	V	D	P	Σ
G	0	0	0	0	0	0	0	**0**
H	1	0	0	0	0	0	0	**1**
K	1	1	0	0	1	0	1	**4**
S	1	1	1	0	1	0	1	**5**
V	1	1	0	0	0	0	0	**2**
D	1	1	1	1	1	0	1	**6**
P	1	1	0	0	0	0	0	**2**
Σ	**6**	**5**	**2**	**1**	**3**	**0**	**3**	

Adjacency matrix associated with G

EXERCISE N° 06

G(X, U) a graph



Representation of G using an adjacency matrix.

	1	2	3	4	5	6	7
1	0	1	0	0	1	1	0
2	0	0	1	0	0	1	0
3	0	1	0	0	0	0	1
4	0	0	0	0	1	0	1
5	0	0	0	1	0	1	0
6	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0

1. Represent G using an incidence matrix.

	a	b	c	d	e	f	g	h	i	I	k	L
1	+1	0	0	0	0	+1	+1	0	0	0	0	0
2	0	-1	0	0	0	0	-1	+1	0	0	+1	0
3	0	+1	+1	0	0	0	0	-1	0	0	0	0
4	0	0	0	+1	-1	0	0	0	0	+1	0	0
5	-1	0	0	0	+1	0	0	0	0	-1	0	+1
6	0	0	0	0	0	-1	0	0	+1	0	-1	-1
7	0	0	-1	-1	0	0	0	0	-1	0	0	0

3. A list of arcs sorted by terminal end

Arcs	**g**	**b**	**h**	**e**	**a**	**I**	**f**	**k**	**L**	**c**	**d**	**i**
Ext.Init	1	3	2	5	1	4	1	2	5	3	4	6
Ext.Ter	2	2	3	4	5	5	6	6	6	7	7	7