

Basics of Graph Theory

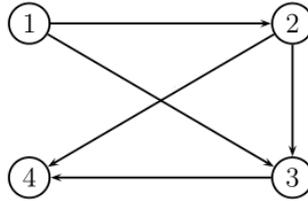
Exercise 1:

Construct a directed graph whose vertices are the integers between **1** and **6**, and whose arcs represent the relation « be a divisor of ».

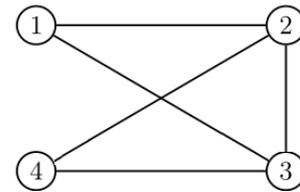
Exercise 2:

Let the following graph $G = (V, E)$ be such that $X = \{1, 2, 3, 4\}$: Give the representation in the different forms given in class:

- Mathematical representation,
- Adjacency matrix,
- Incidence matrix,
- Adjacency list.



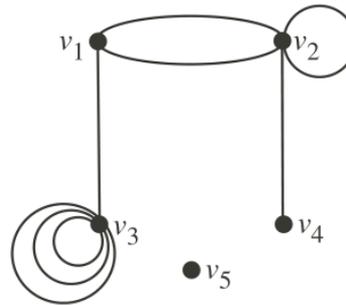
$G1=(V_1,E_1)$



$G2=(V_2,E_2)$

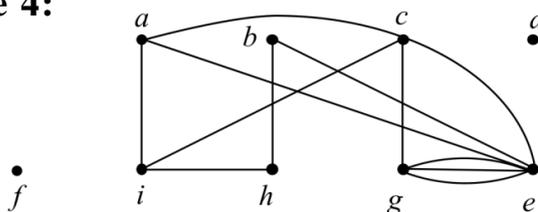
Exercise 3:

Represent this graph by an adjacency matrix:

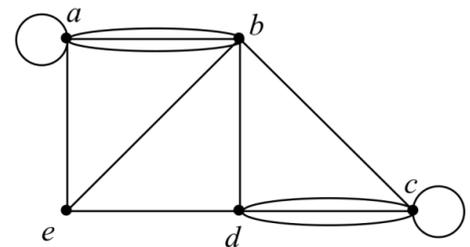


Exercise 4:

a)



b)



1. For the following 2 graphs (a and b), determine:
 - The number of vertices,
 - The number of edges,
 - The degree of each vertex.
 - Calculate the sum of the degrees of the vertices of each graph.
2. Show that: $\sum_{v \in V} d(v) = 2 |E|$ (The sum of the degrees in a graph = twice the number of edges)
3. Show that a graph's number of vertices of odd degrees is even.
4. Is it possible to connect 7 computers so that each device is connected to exactly 3 others?

Exercise 5:

If 10 people each shake hands with each other, how many handshakes took place? What does this question have to do with graph theory?