

# Graphs

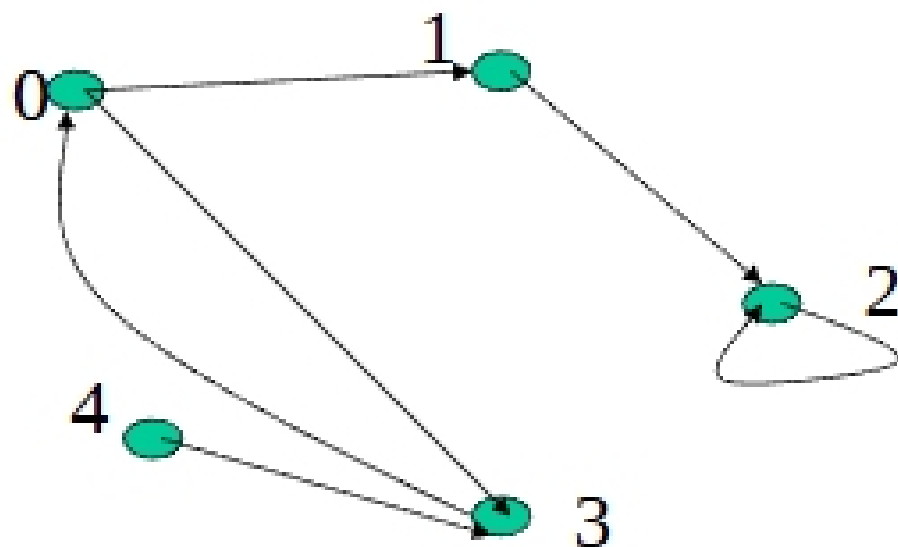
- Definition of Graphs and Related Concepts
- Representation of Graphs
- The Graph Class
- Graph Traversal
- Graph Applications

# Definition of Graphs

- A graph is a finite set of nodes with edges between nodes
- Formally, a graph  $G$  is a structure  $(V,E)$  consisting of
  - a finite set  $V$  called the set of nodes, and
  - a set  $E$  that is a subset of  $V \times V$ . That is,  $E$  is a set of pairs of the form  $(x,y)$  where  $x$  and  $y$  are nodes in  $V$

# Examples of Graphs

- $V = \{0, 1, 2, 3, 4\}$
- $E = \{(0, 1), (1, 2), (0, 3), (3, 0), (2, 2), (4, 3)\}$



When  $(x, y)$  is an edge, we say that  $x$  is *adjacent to*  $y$ , and  $y$  is *adjacent from*  $x$ .

0 is adjacent to 1.

1 is not adjacent to 0.

2 is adjacent from 1.