

## Section 8.1 Introduction to Graphs

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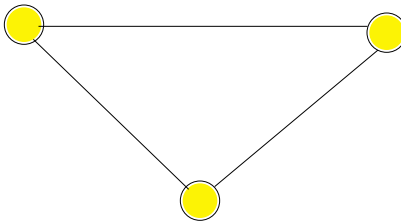
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### Undirected Graphs

- A *simple* graph  $(V,E)$  consists of vertices,  $V$ , and edges,  $E$ , connecting distinct elements of  $V$ .

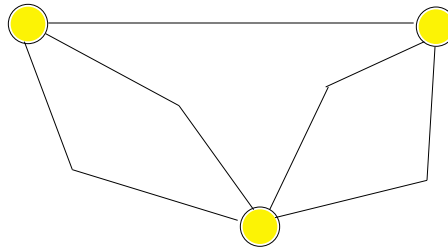
- no arrows
- no loops
- can't have multiple edges joining vertices

Example:



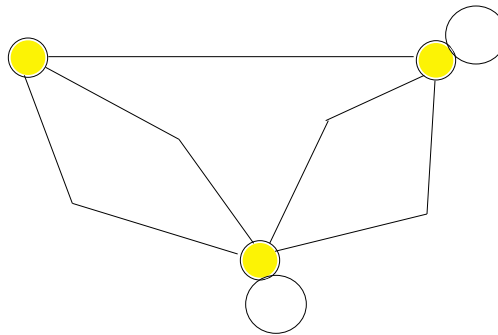
- A *multigraph* allows multiple edges for two vertices
  - redundancy in networks
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Example:



- A *pseudograph* is a multigraph which permits loops.
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Example:

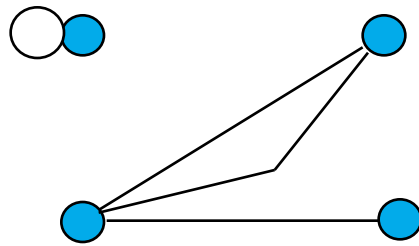


## Directed Graphs

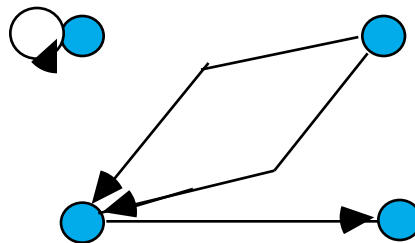
- Directed graph  $(V, E)$  - single directed edges between vertices
- Directed multigraph - multiple directed edges between vertices

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Examples:



A pseudograph



A directed multigraph

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