Chapter 9 Graphs

9.1 Introduction to Graphs

1. Introduction

- Types of Graphs
  - Definition 1 (page 589)
    - A graph G=(V,E) consists of V, a nonempty set of vertices (顶点), and E, a set of edges.
    - Each edge has either one or two vertices associated with it, called its endpoints
    - Example: See Figure 1 (page 590).

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- Types of Unordered Graphs (page 591)
  - Simple Graph
    - A graph in which each edge connects two different vertices and where no two edges connect the same pair of vertices is called simple graph.
    - We use the notation {u, v} stand for an edge of a simple graph associated to {u, v}.

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- Types of Unordered Graphs (page 591)
  - Multigraph
    - Graphs that may have multiple edges connecting the same vertices are called multigraphs.
    - Example: See Figure 2.
  - Pseudograph (page 590)
    - Graphs that may include loops, and possibly multiple edges connecting the same pair of vertices, are called pseudograph.
    - Example: See Figure 3.

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- Definition 4 (page 591)
  - A directed graph G=(V, E) consists of a set of vertices V and a set of edges E that are ordered pairs of elements of V.
  - Remark: the edge from u to v-------(u,v)
  - Example: See Figure 4 (page 591).

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- Types of Ordered Graphs
  - Simple Directed Graphs
    - When a directed graph has no loops and has no multiple directed edges, it is called a simple directed graphs.
  - Directed Multigraphs
    - Directed graphs that may have multiple directed edges from a vertex to a second (possibly the same) vertex are called directed multigraphs.
    - Example: See Figure 5 (page 591).

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- Summary (Graph Terminology, page 540)

Type	Edges	Multiple Edges	Loops
Simple Graph	Undirected	N	N
Multigraph	Undirected	Y	N
Pseudograph	Undirected	Y	Y
Directed Graph	directed	N	Y
Directed Multigraph	directed	Y	Y

Homework

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