§10.1 Introduction to Graphs

1. Types of Graphs

(1) Definition 1 (page 641)

A graph G=(V,E) consists of V, a nonempty set of vertices (顶点) or nodes, and E, a set of edges.

Each edge has either one or two vertices associated with it, called its endpoints

Example: Figure 1 (page 642).

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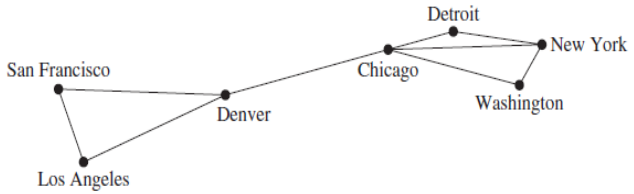


(2) Types of Unordered Graphs (page 642~643)

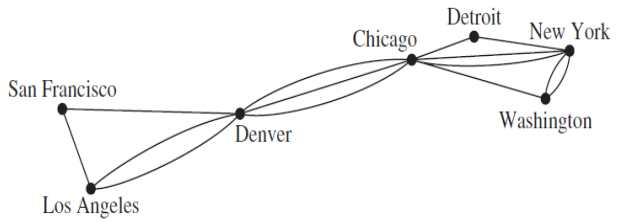
(a) Simple Graph

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 and v.

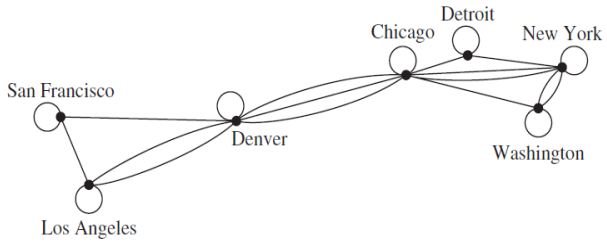
(b) Multigraph

Graphs that may have multiple edges connecting the same vertices are called multigraphs.



(c) Pseudograph (page 643)

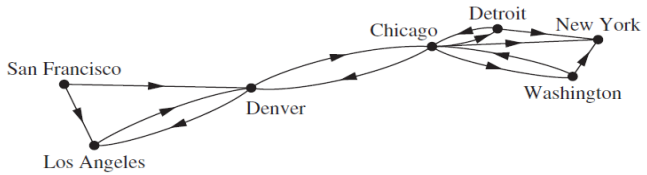
Graphs that may include loops, and possibly multiple edges connecting the same pair of vertices, are called pseudograph.



(3) Definition 4 (page 643)

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.

the edge from u to v ------- (u,v)



(4) Types of Directed Graphs

(a) Simple Directed Graphs

When a directed graph has no loops and has no multiple directed edges, it is called a simple directed graphs.

(b) Directed Multigraphs

Directed graphs that may have multiple directed edges from a vertex to a second (possibly the same) vertex are called directed multigraphs.

(6) Summary (Graph Terminology), page 644)

Type	Edges	Multiple Edge?	Loops?
Simple Graph	Undirected	No	No
Multigraph	Undirected	Yes	No
Pseudograph	Undirected	Yes	Yes
Simple directed graph	Directed	No	No
Directed multigraph	Directed	Yes	Yes