

CSE 321 Discrete Structures

Winter 2008
Lecture 26
Graph Theory

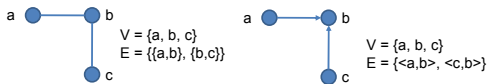
Announcements

- Readings
 - This week
 - Graph Theory, 9.1 – 9.4
- Schedule
 - Quiz Section, Thursday
 - No class Friday.
 - Review Session, Sunday, 2pm
 - Final Exam, Monday, March 17



Highlights from Lecture 25

- Graph Theory



- Graph Applications

- Facebook Graph
- Web Graph
- Communication Graphs

Handshake Theorems

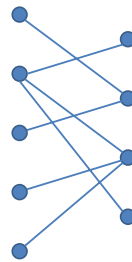
$$2|E| = \sum_{v \in V} \deg(v)$$

$$\sum_{v \in V} \deg^-(v) = \sum_{v \in V} \deg^+(v) = |E|$$

Special Graphs

- Complete Graphs K_n
- Cycle C_n
- Hypercube Q_n
- Mesh $M_{n,m}$

Bipartite Graphs



2-coloring

- A graph is two colorable iff all cycles have even length

Graph Representations

- Adjacency Lists
- Adjacency Matrices
- Incidence Matrices

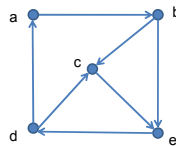
Graph Connectivity

Strong connectivity vs. Weak Connectivity

Strongly Connected Components

Counting Paths

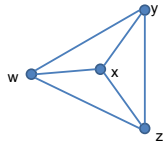
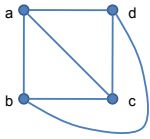
Let A be the Adjacency Matrix. What is A^2 ?



$$\begin{bmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

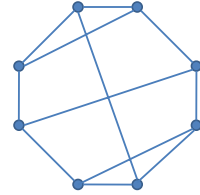
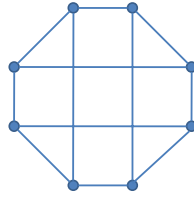
Graph Isomorphism I

Are these two graphs the same?



Graph Isomorphism II

Are these graphs the same?



Graph Isomorphism III

Are these graphs the same?

