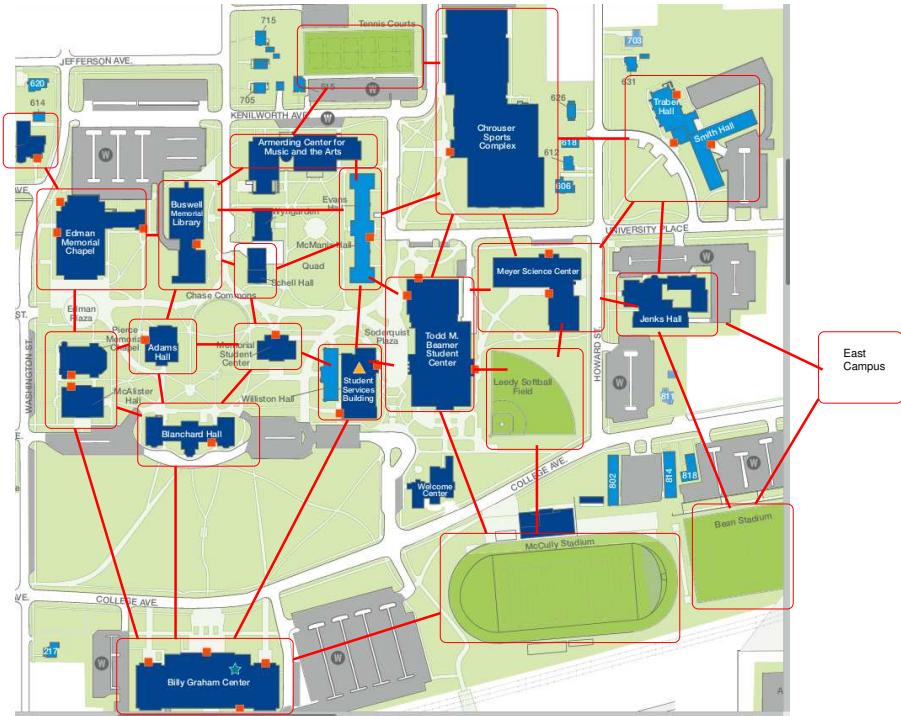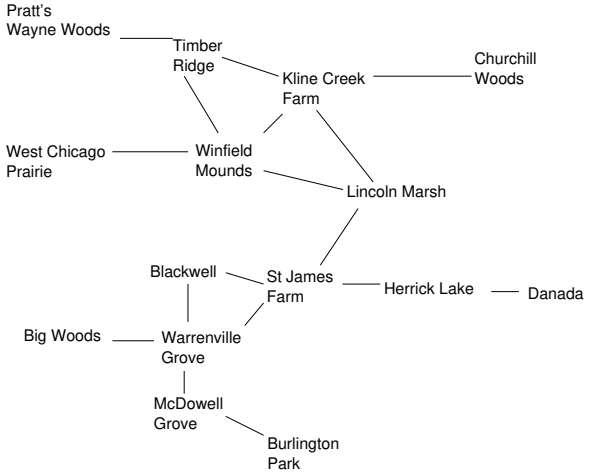Chapter 4, Graphs:
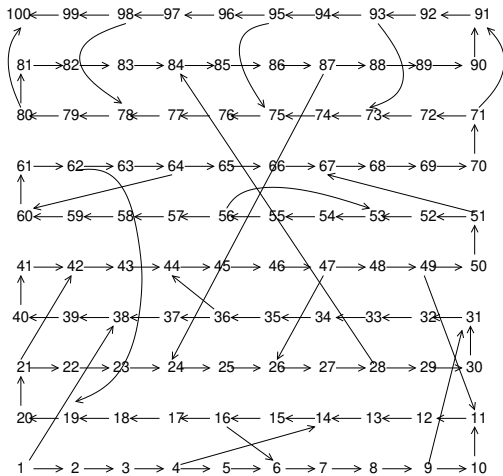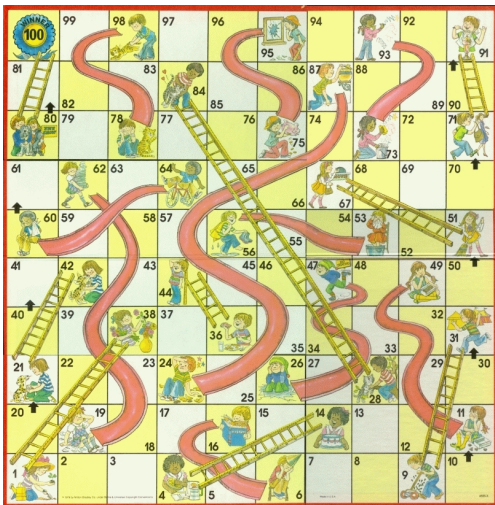
▶ Concepts and implementation (**Today**)
▶ Traversal (Wednesday)
▶ Minimum spanning trees (Friday and next week Monday)
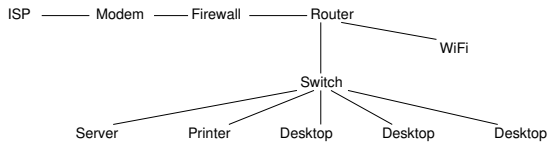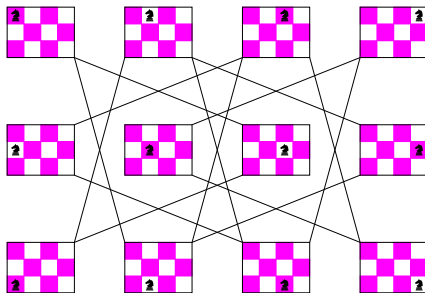▶ Single-source shortest paths (next week)

Today:

▶ Applications of graphs
▶ Vocabulary, taxonomy, and theory
▶ Representing and implementing graphs

715

JEFFERSON AVE.

620

614

Tennis Courts

705

815

KENILWORTH AVE.

703

W

631

626

Traber Hall

Smith Hall

Chrouser Sports Complex

Armerding Center for Music and the Arts

618

612

606

Buswell Memorial Library

Wyngarden

Evans

McManis Hall

Edman Memorial Chapel

Quad

Schell Hall

UNIVERSITY PLACE

Chase Commons

Edman Plaza

Pierce Memorial Chapel

Adams Hall

Memorial Student Center

Soderquist Plaza

Meyer Science Center

Jenks Hall

HOWARD ST.

WASHINGTON ST.

McAlister Hall

Student Services Building

Todd M. Beamer Student Center

East Campus

Williston Hall

Blanchard Hall

Leedy Softball Field

COLLEGE AVE.

802

814

818

Welcome Center

Bean Stadium

McCully Stadium

COLLEGE AVE.

217

Billy Graham Center

A

Pratt's Wayne Woods

Timber Ridge

Kline Creek Farm

Churchill Woods

West Chicago Prairie

Winfield Mounds

Lincoln Marsh

Blackwell

St James Farm

Herrick Lake

Danada

Big Woods

Warrenville Grove

McDowell Grove

Burlington Park

Karenin —*spouse*— Anna —*paramour*— Vronsky —*ex*— Kitty
Anna —*sibling*— Oblonsky —*friend*— Levin —*spouse*— Kitty
Oblonsky —*spouse*— Dolly —*sibling*— Kitty

ISP —— Modem —— Firewall —— Router
WiFi
Switch
Server   Printer   Desktop   Desktop   Desktop

H — O — H
Water

O ═ C ═ O
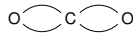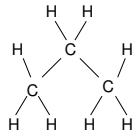Carbon dioxide

Propane

- Graph
- Vertex (compare *node*)
- Edge (compare *link*)
- Incident
- Adjacent
- Degree
- Complete
- Dense

- Sparse
- Directed graph
- Undirected graph
- Parallel edge
- Self loop
- Simple graph
- Weighted graph

Adjectives

Trivial	Having only one vertex and no edges.
Simple	Having no repeated *vertices* (except, possibly, the initial and terminal).
Closed	Having the same vertex as initial and terminal.

Nouns

Walk	An alternating sequence of vertices and edges, each edge coming between its end points.
Path	A walk with no repeated *edge* (repeated vertices are ok).
Circuit	A closed path (no repeated edges, initial and terminal the same).
Cycle	A simple circuit (no repeated edges or vertices, except the initial and terminal, which are the same).

Walk

Closed walk   Path

Circuit   Simple path

Cycle
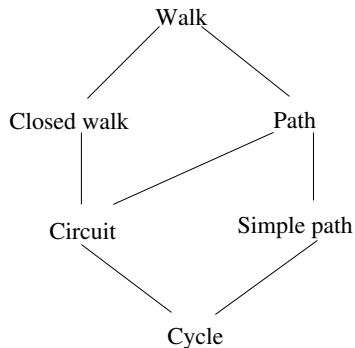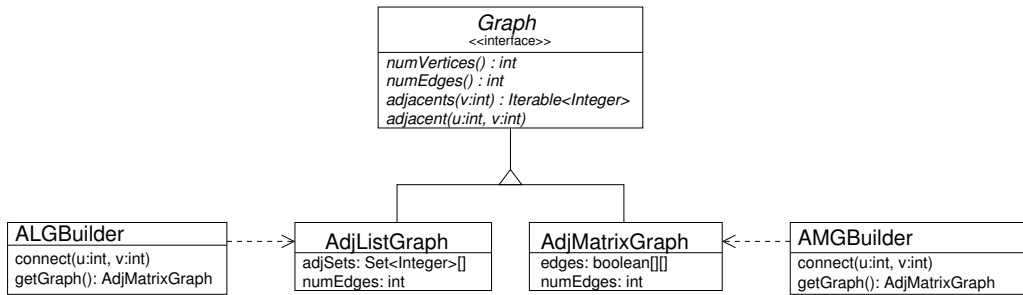
	Adjacency matrix	Adjacency list
Space	$\Theta(V^2)$	$\Theta(V + E)$
adjacent(u, v)	$\Theta(1)$	$\Theta(deg(u))$ (expected case)
adjacents(u)	$\Theta(V)$	$\Theta(deg(u))$

Coming up:

Do **heaps and priority queue** *project (suggested by Wed, Sept 28)*
Do **bit vector and N-set** *project (suggested by Fri, Sept 30)*

Due **Fri, Sept 30** *(but spread it out):*
Read Section 4.(1–3)
Do Exercises 4.(26-29).
Take graph quiz