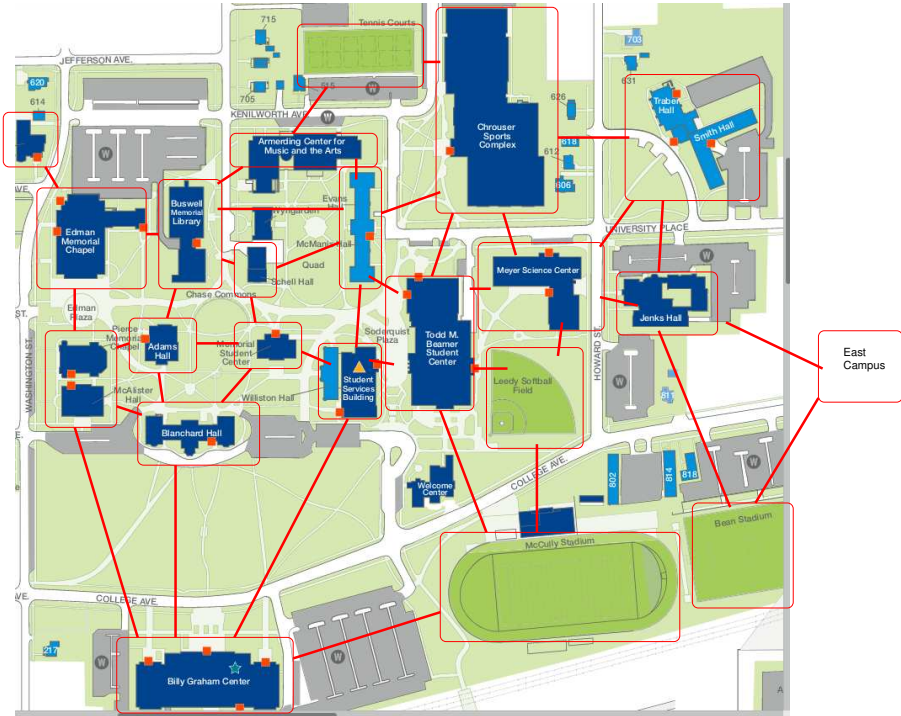


## Chapter 4, Graphs:

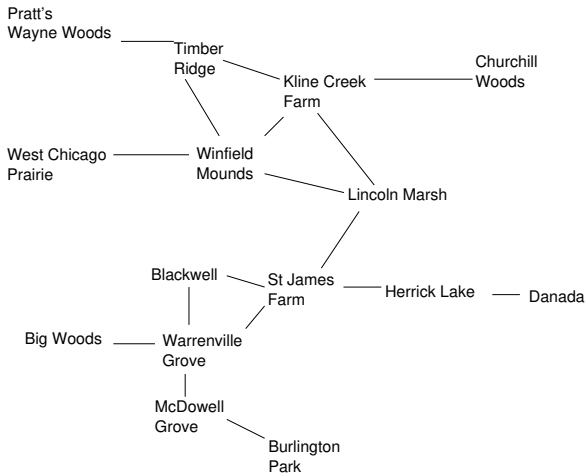
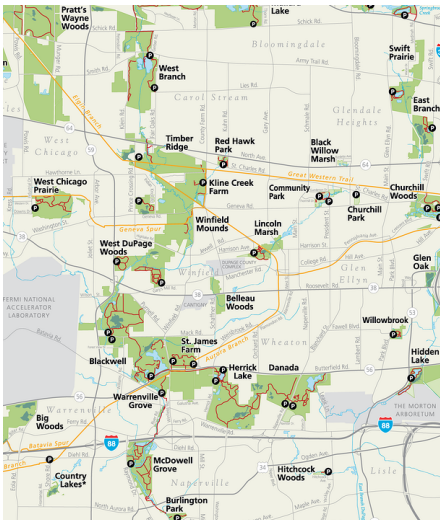
- ▶ (Finish priority queues and heaps. . . (**Today**))
- ▶ Concepts and implementation (**Today**)
- ▶ Traversal (*Wednesday and in lab Thursday*)
- ▶ Minimum spanning trees (Friday and next week Monday)
- ▶ Single-source shortest paths (next week Wednesday and Friday)

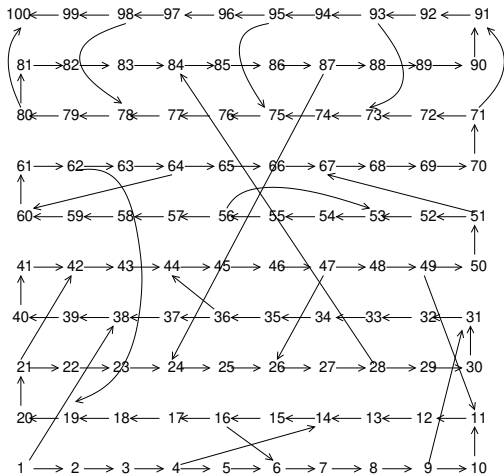
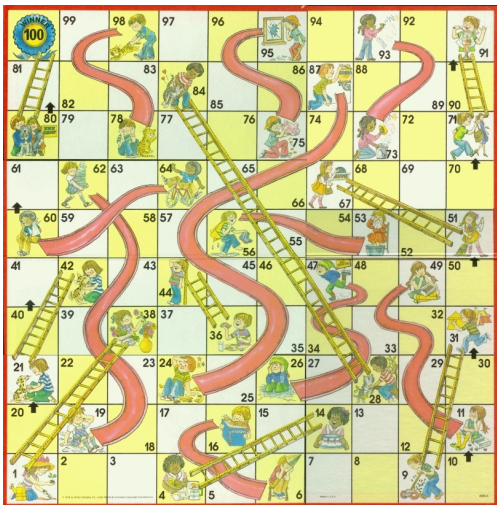
## Today:

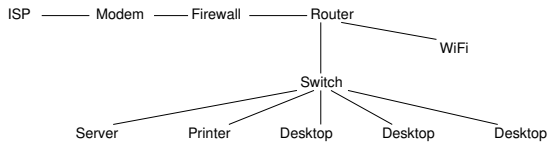
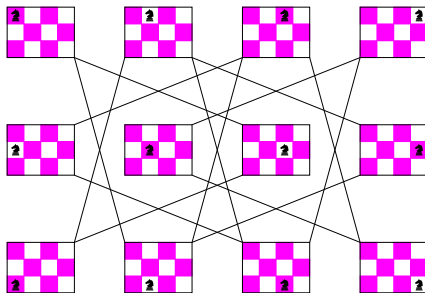
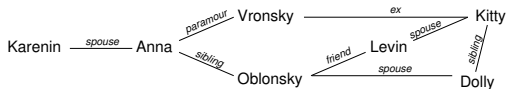
- ▶ Applications of graphs
- ▶ Vocabulary, taxonomy, and theory
- ▶ Representing and implementing graphs



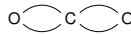
East  
Campus



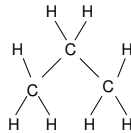




Water



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

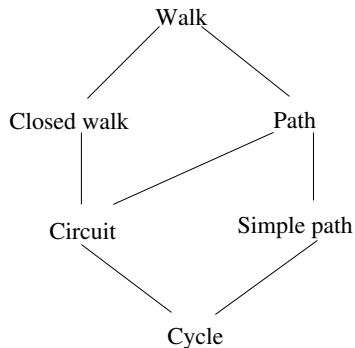
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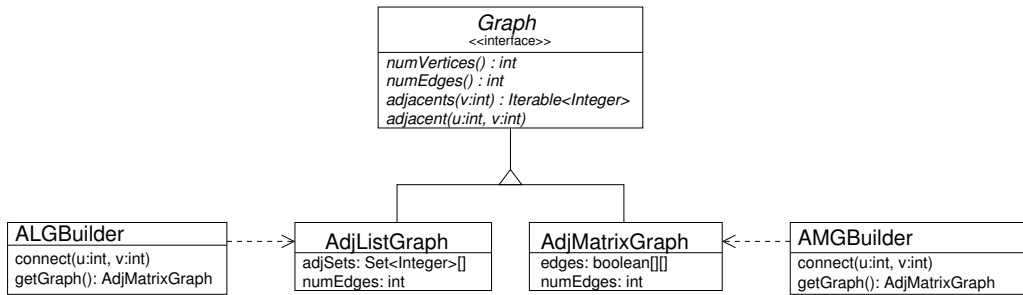
Trivial	Having only one vertex and no edges.
Simple	Having no repeated <i>vertices</i> (except, possibly, the initial and terminal).
Closed	Having the same vertex as initial and terminal.

## Nouns

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Walk	An alternating sequence of vertices and edges, each edge coming between its end points.
Path	A walk with no repeated <i>edge</i> (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).







	Adjacency matrix	Adjacency list
Space	$\Theta(V^2)$	$\Theta(V + E)$
<code>adjacent(u, v)</code>	$\Theta(1)$	$\Theta(deg(u))$ (expected case)
<code>getAdjacents(u)</code>	$\Theta(V)$	$\Theta(deg(u))$

## Coming up:

*Do heaps and priority queue project (Fri, Oct 4)*

*Due **Thurs, Oct 3:***

*Read Sections 4.(1-3) This is a big chunk—spread it out!*

*Do Exercises 4.1 and 4.19*

*Take “graph concepts, implementation, and traversal” quiz*