

1  CS3134 #21

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2  Administrivia

- Solutions, testers, etc. up!

3  Agenda

- Graphs
  - *Unweighted* graphs
- Graphs are the last topic! 80

4  What are graphs?

- Linked list :: trees →  
trees :: graphs
- In other words, we no longer limit the number of children each node may have, and we don't forbid loops
  - (Sometimes!)
- Examples?
  - Bridges of Konigsburg (p. 619)
    - Solution: vertices of odd degree make it impossible
    - Foundation of graph theory (1736)

5  Definitions

- Adjacency
- Path
  - Multiple definitions ☹
- Connected graph
- Directed graph
- Weighted graph
  - These two come later!

6  Representing a graph

- The OO way
- The canonical (and book) way
  - Adjacency matrix
    - I lied – we *will* use 2D matrices
  - Adjacency list
- Advantages and disadvantages?
- Book => separate vertex class
- For some reason, the book does it the latter

7  Searching graphs?

- Goal: find connectivity
- Depth-first search
  - Push node on a stack

- While stack not empty:
  - Peek and get an unvisited adjacent node
  - Visit it (pushing it on the stack)
  - If no adjacent nodes, pop and repeat
- Game searching and branching factor
- Breadth-first search
  - Same process, but queue instead

8  **Next time**

- Continue unweighted graphs