

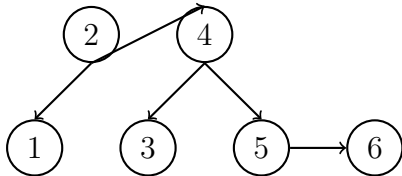
Today: Synthesis; review. §§ 19.*; 22.*.

Next class Synthesis; review. §§ 18.*; 21.*.

Reminders: Portfolio work; newsgroup; homework.

1. Write your group members' names below. Underline your name.

2. Depict all the stages in the restructuring of the following AA-tree when the key 1 is removed. It may be convenient to use dashed lines to separate tree levels, as in Andersson's paper.¹



¹Arne Andersson, "Balanced Search Trees Made Simple," in *Proceedings of the Workshop on Algorithms and Data Structures* (Montreal, Canada, 1993).

3. Depict the sequence of *AVL* tree states resulting from the insertion of the following keys, in the order presented, into an initially empty tree.

6, 2, 0, 5, 9, 1, 7, 3, 8, 4

You must depict intermediate tree states, including the state after each insertion, clearly marking and identifying each rotation.

- Repeat Question 3 for *bottom-up red-black* trees. Follow the graphical conventions used in class: round nodes for red and boxed nodes for black. You must depict intermediate tree states, including the state after each insertion, clearly marking and identifying each rotation and color change.

6, 2, 0, 5, 9, 1, 7, 3, 8, 4

5. Repeat Question 3 for *bottom-up splay* trees,

You must depict intermediate tree states, including the state after each insertion, clearly marking and identifying each zig, zig-zig, and zig-zag operation.

6, 2, 0, 5, 9, 1, 7, 3, 8, 4