Name:

1. (1 pt.) Write your name in the space provided above.

2. (14 pts.) Based on the definitions in homework assignments 2 and 3, depict all noni-somorphic *level-wise 5-search-trees* with 7 nodes, with labels drawn from the domain $L = \{1, 2, 3, 4, 5, 6, 7\}$.

   Repeat the above for 8 nodes.

   Explain your answers. You may use shorthand as used in class, but you must ensure that the result is clear.

3. (20 pts.) Determine the **AA-tree** produced when the following operations are applied, *in the order presented*, to an initially empty tree. *Use precisely the methods from Andersson's paper*[1] *as discussed in class.* Further:

- Depict intermediate states of the tree, including at least the states *before and after* each skew or split operation.

- Indicate the node to which each skew or split operation is applied.

- Ensure that the level to which each node belongs is absolutely clear, either by very careful drawing, as in the textbook, or by demarcation, as in Andersson's paper.

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insert(5), insert(17), insert(11), insert(13), insert(27),
insert(23), insert(2), remove(17), insert(3), remove(11),
insert(17), remove(2).
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[1] Arne Andersson, "Balanced Search Trees Made Simple," in *Proceedings of the Workshop on Algorithms and Data Structures* (Montreal, Canada, 1993).

[additional space for answering the earlier question]

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