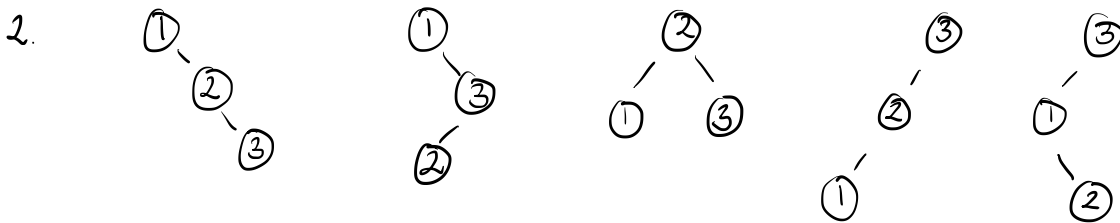
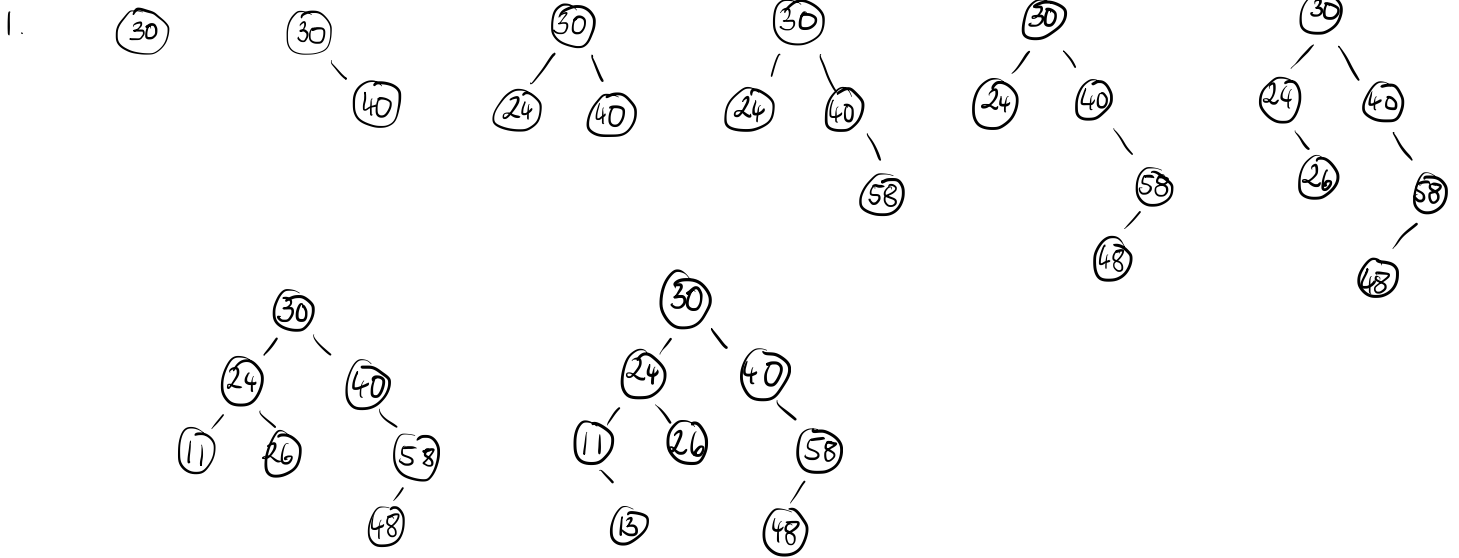


Exercise 9 - Solutions



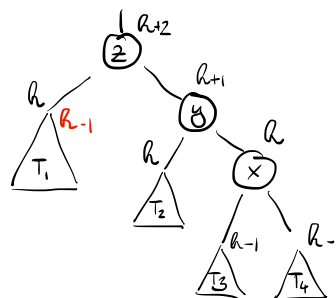
So 5 trees altogether.



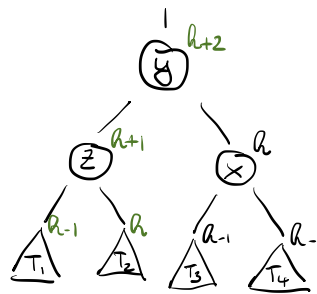
4. Same example as above, the trees are AVL at every step.

5. (a) Before the delete:

(b) After the delete
(violates
AVL balancing
condition)

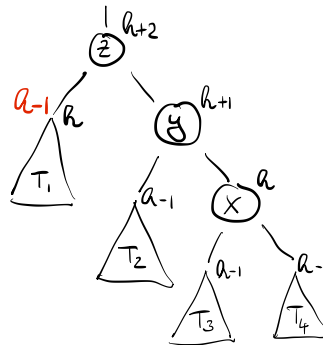


(c) After restructuring

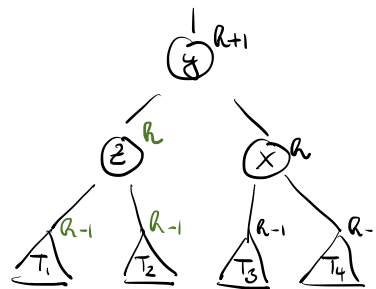


6. (a) Before deletion

(b) After the delete



(c) After restructuring



7. A left-leaning chain

8. (i) Insert, one-by-one, each of the n elements into the tree at the cost of $O(\log n)$ each

(ii) Output an in-order traversal of the tree at $O(n)$ cost

9. Yes, as splay tree has guaranteed $O(n \log n)$ cost for n inserts in sequence.

10. Maintain the in-order traversal as a doubly-linked list.

- before & after are clearly $O(1)$
- naive insert/delete requires update of this linked list, but this can be done in $O(1)$
- Any restructurings do not change the in-order sequence, so do not require updates to the linked list.