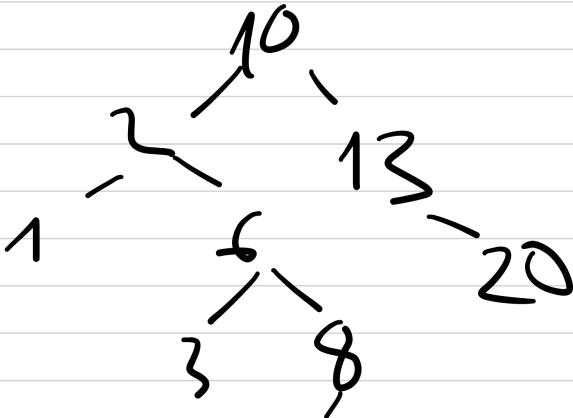


Assignment 4 - Tree

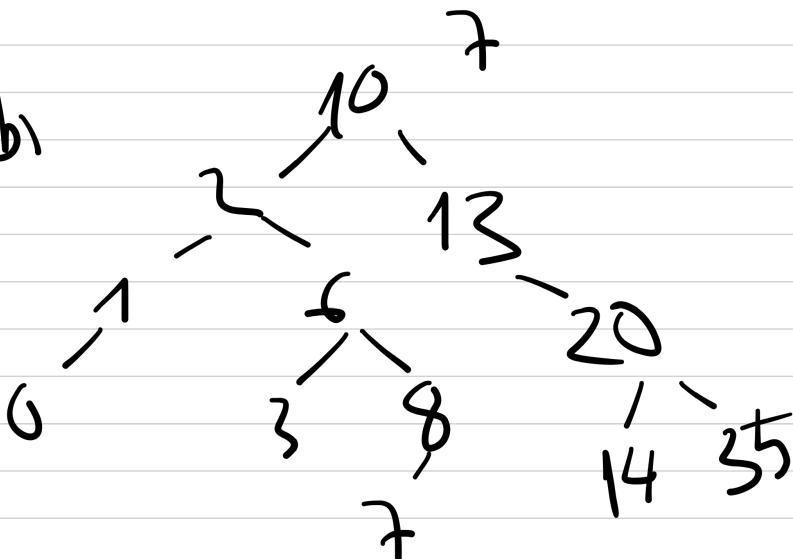
Bai 2

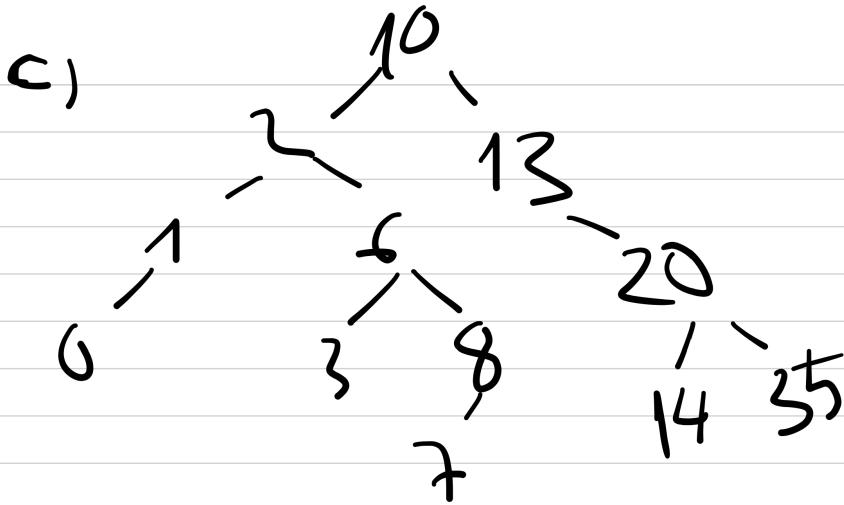
2. Given a list of integer numbers: 2, 1, 10, 6, 3, 8, 7, 13, 20.
- Draw the binary search tree
 - Draw the binary search tree after inserting values: 14, 0, 35
 - Draw the binary search tree after deleting: 6, 13, 35

a)

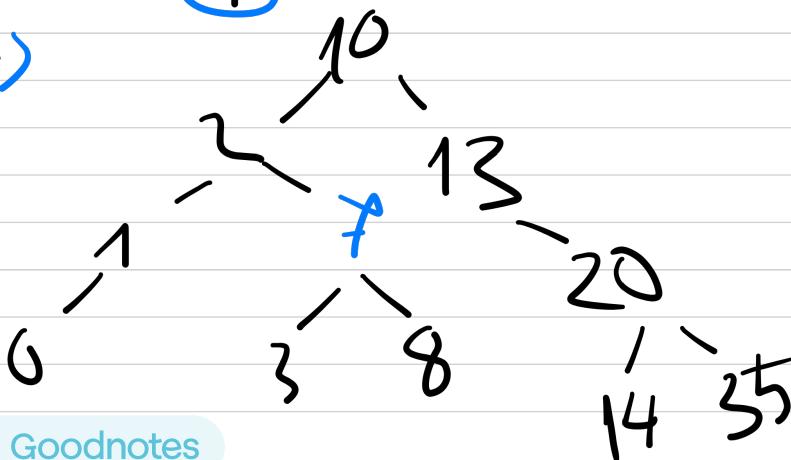
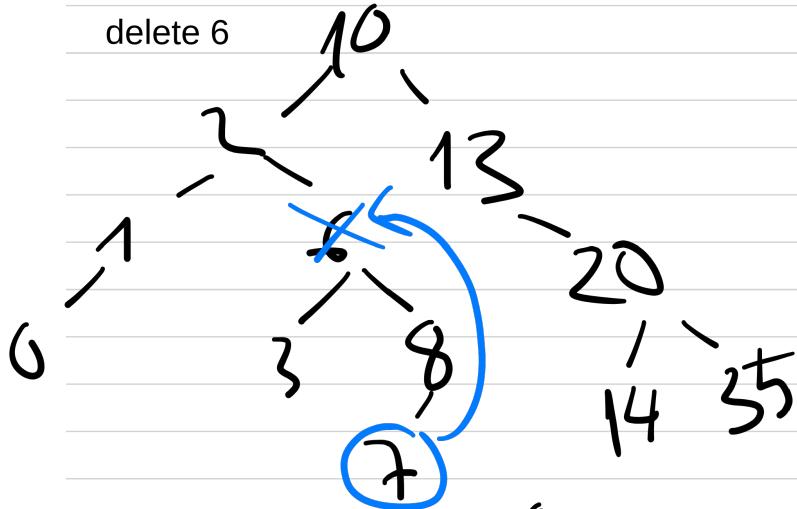


b)

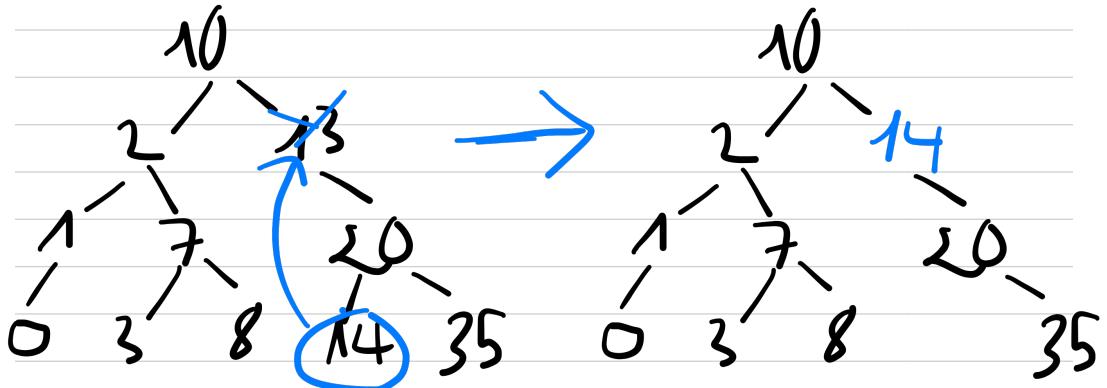




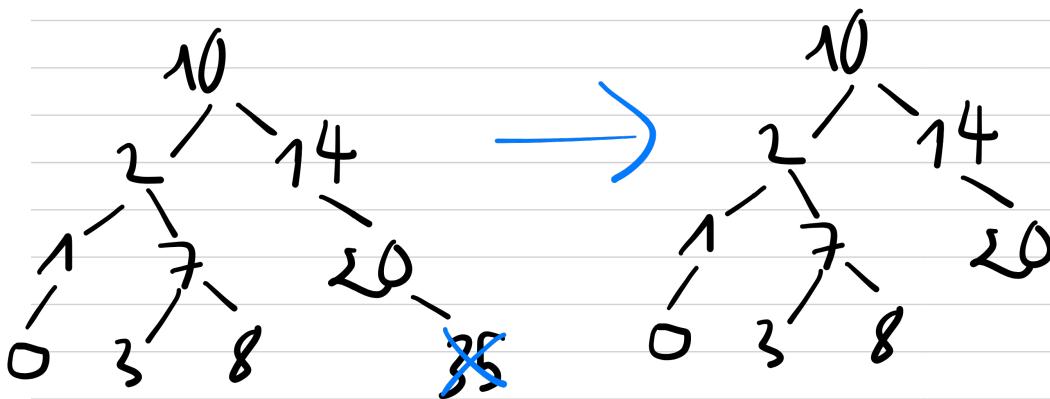
delete 6



delete 13

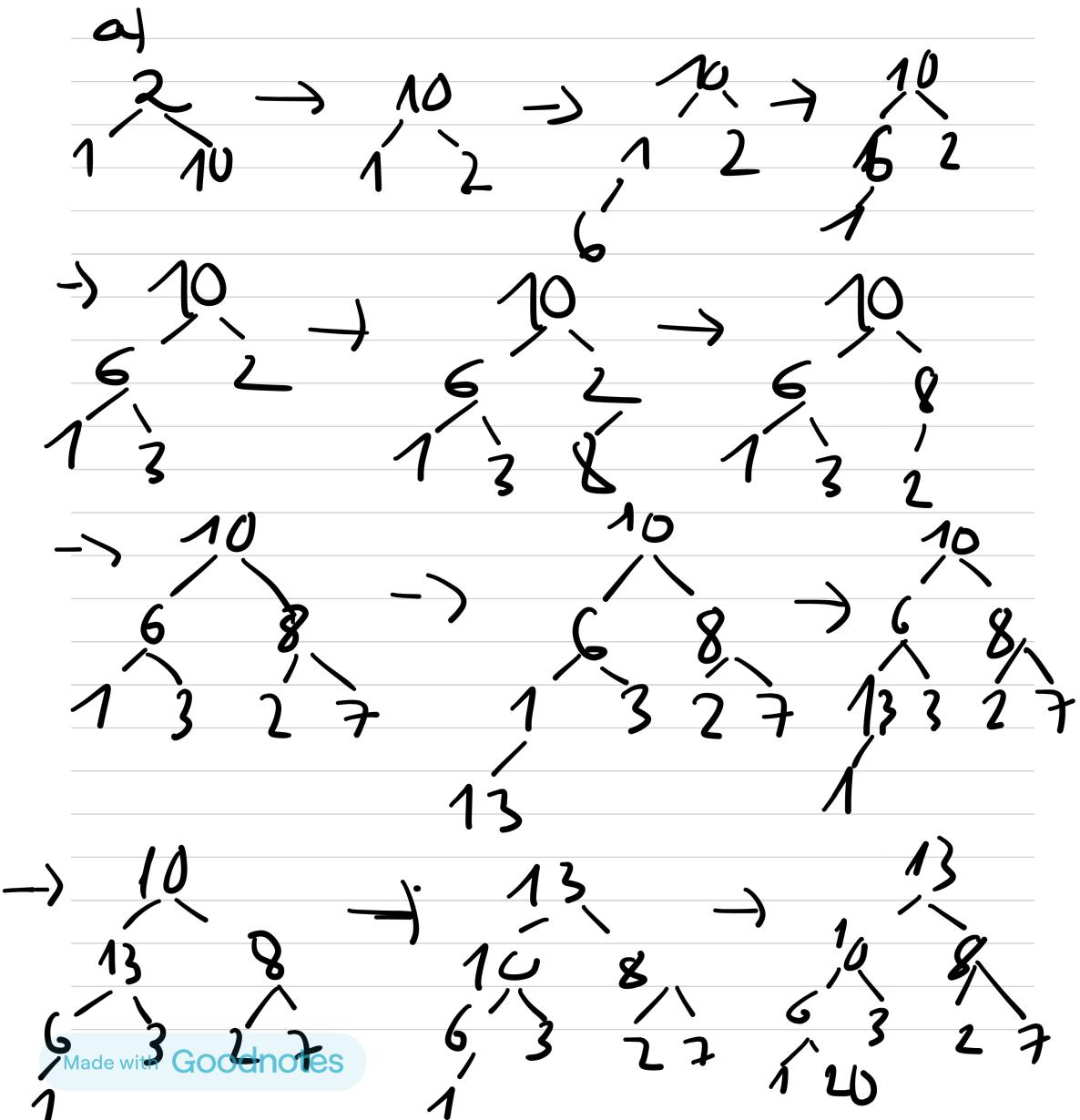


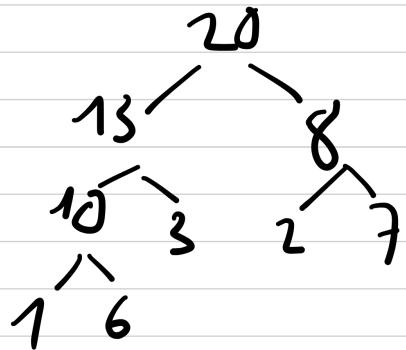
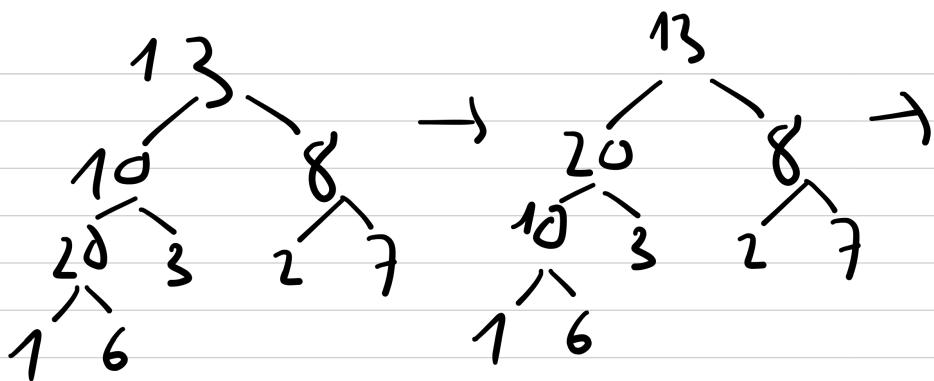
delete 35



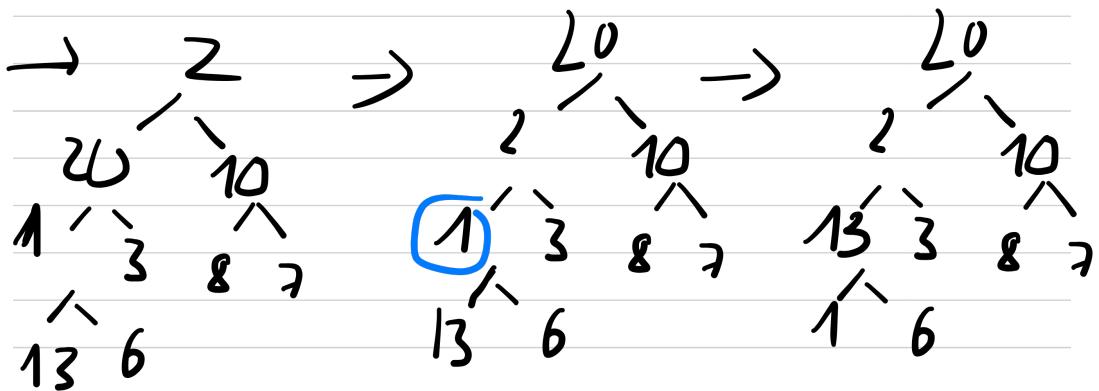
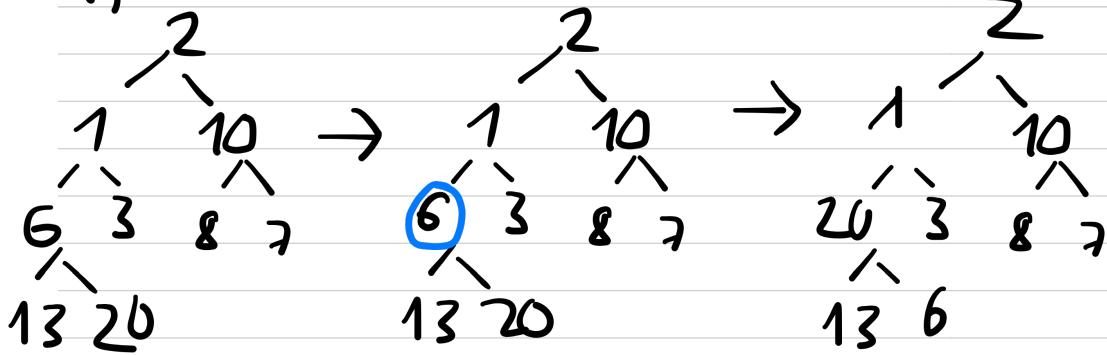
3. Given a list of integer numbers: 2, 1, 10, 6, 3, 8, 7, 13, 20.

- Draw the heap tree
- Draw the heap tree after inserting values: 14, 0, 35
- Draw the heap tree after deleting: 6, 13, 35

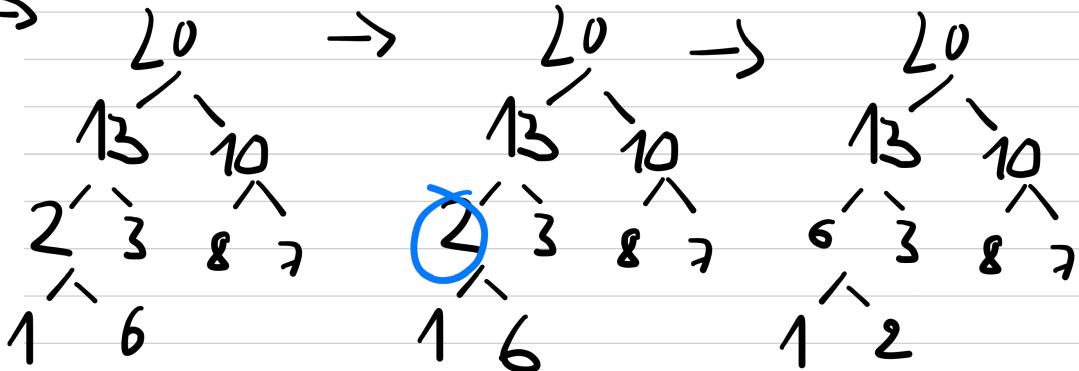


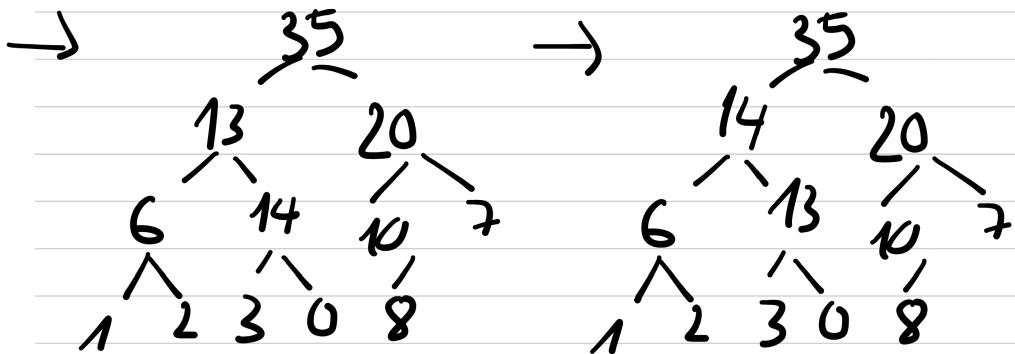
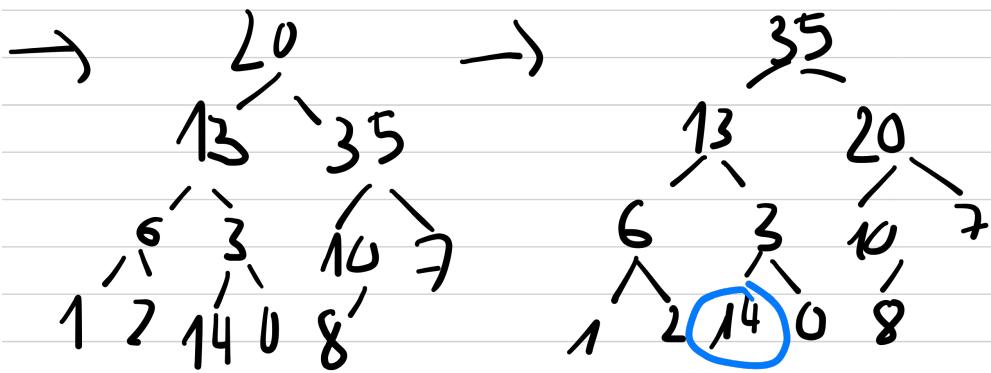
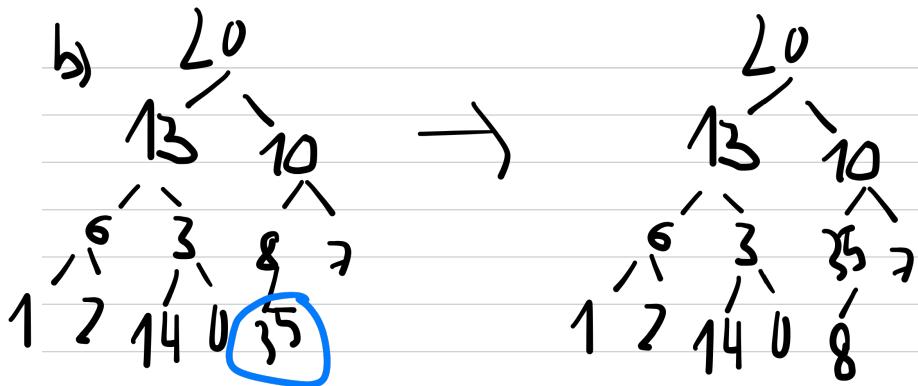


a)

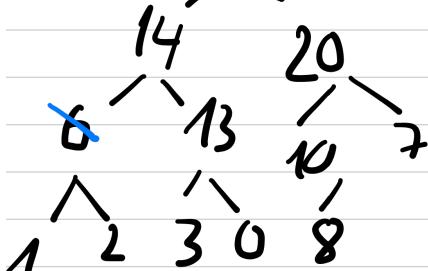


→

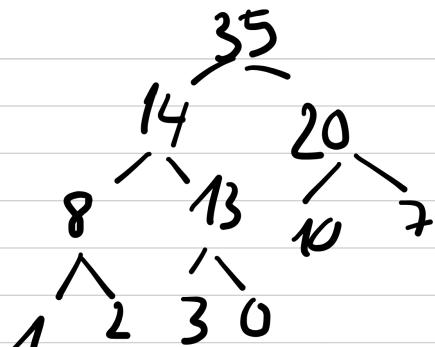




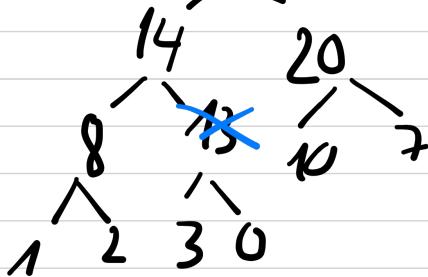
c1 35



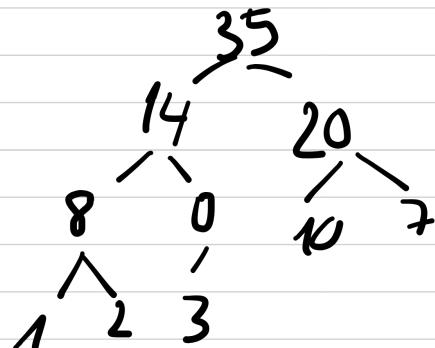
→



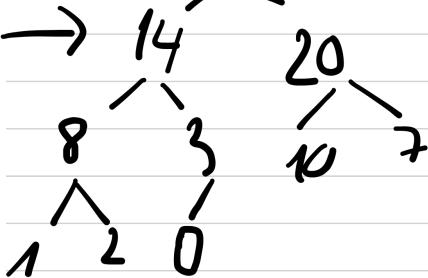
→ 35



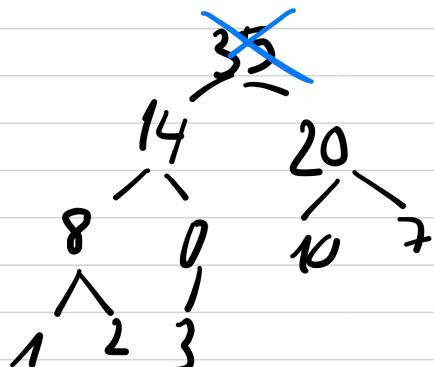
→



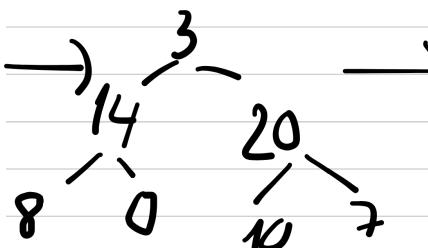
→ 35



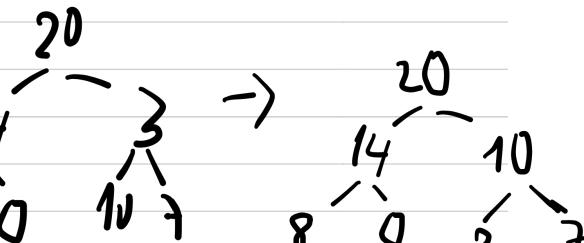
→



→ 3



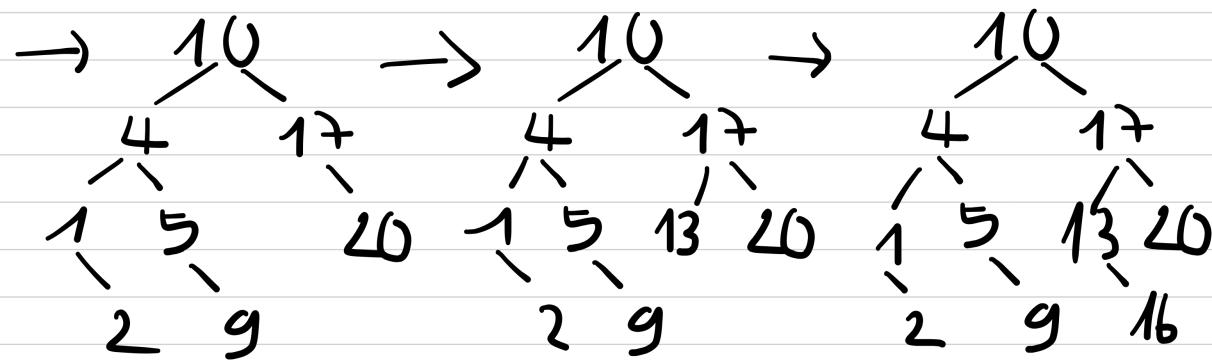
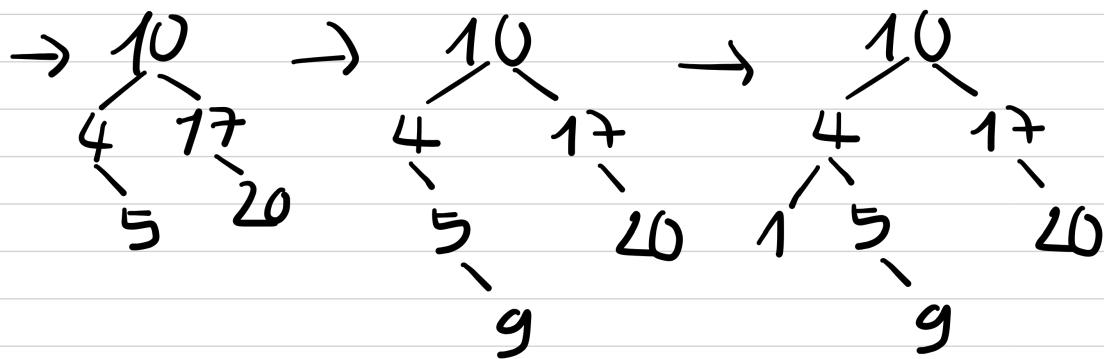
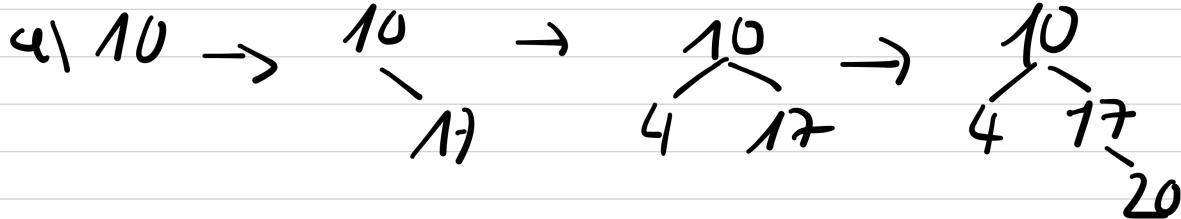
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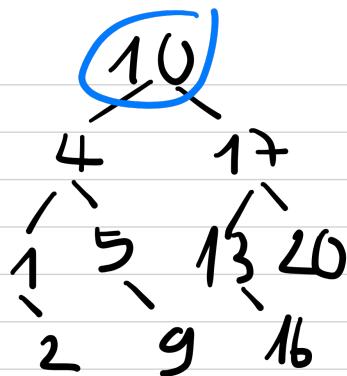
4. Use random.org to generate a set of 10 integers from 1-20 (S1).

10, 17, 4, 20, 5, 9, 1, 2, 13, 16

- Insert elements from S1 to a binary search tree one by one and draw the binary search tree after each step.
- Write out the procedure to find and remove the maximum element from binary search tree **in detail**.
- Write out the procedure to find and remove the minimum element from binary search tree **in detail**.



b)



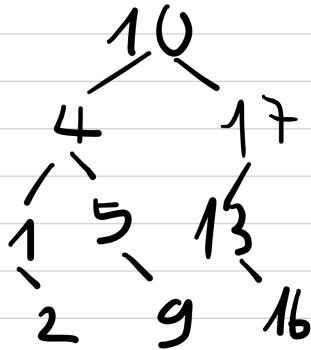
* Tìm max element

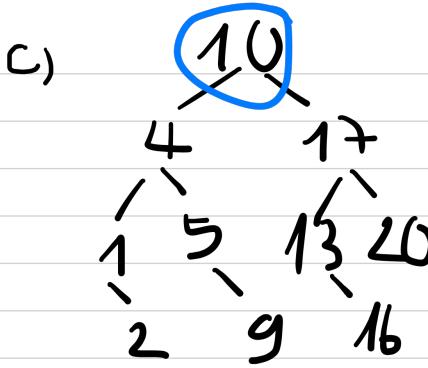
- Bắt đầu xét từ gốc 10, 10 có con phải nên ta xét node con phải là 17
- Với node 17, có con phải nên ta xét node con phải là node 20.
- Với node 20, không có con phải nên max element = 20.

* Remove max element

- Node 20 là lá nên ta chỉ cần delete node 20.

Ta được BST sau khi xóa node max như sau:





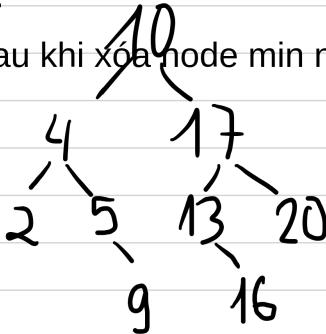
* Tìm min element

- Bắt đầu xét từ gốc 10, 10 có con trái nên ta xét node con trái là node 4
- Với node 4, có con trái nên ta xét node con trái là node 1.
- Với node 1, không có con trái nên min element = 1.

* Remove min element

- Node 1 là node có 1 node con nên muốn xóa ta lấy node con để thay thế vào node 1.

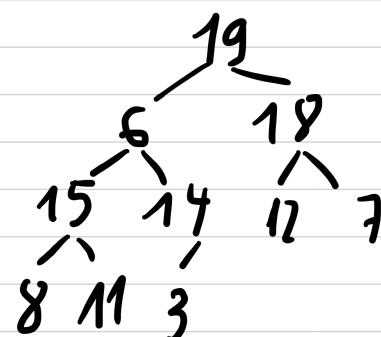
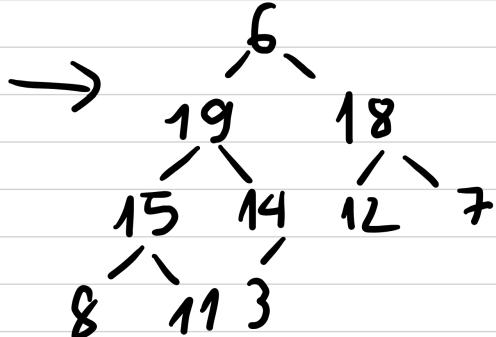
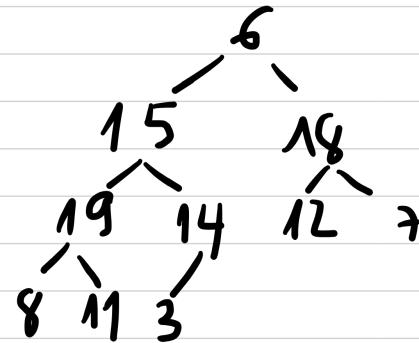
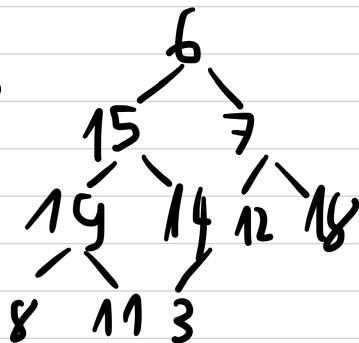
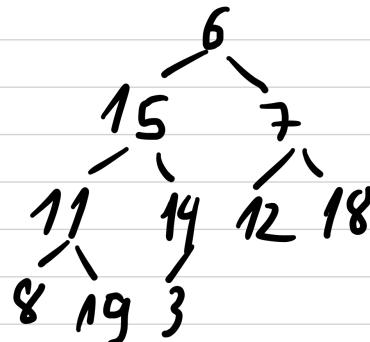
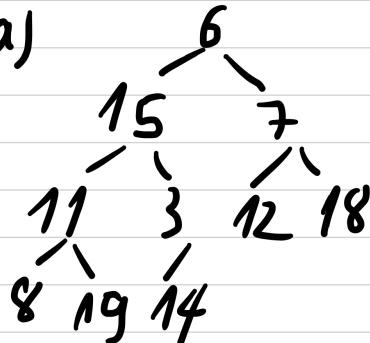
Ta được BST sau khi xóa node min như sau:

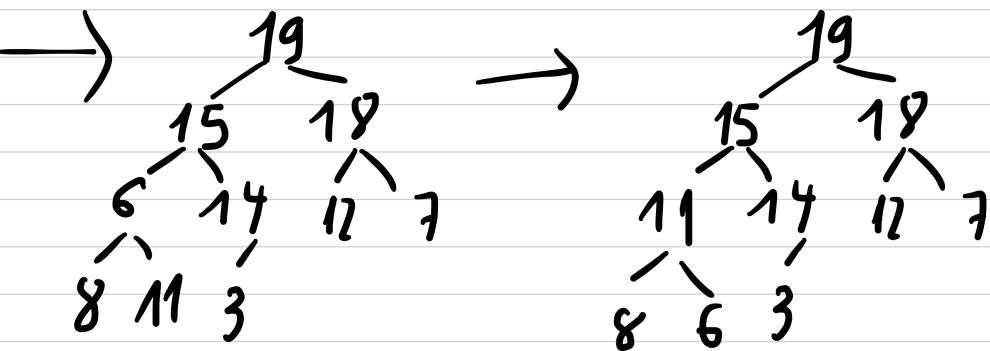


5. Use random.org to generate another set of 10 integers from 1-20 (S2).

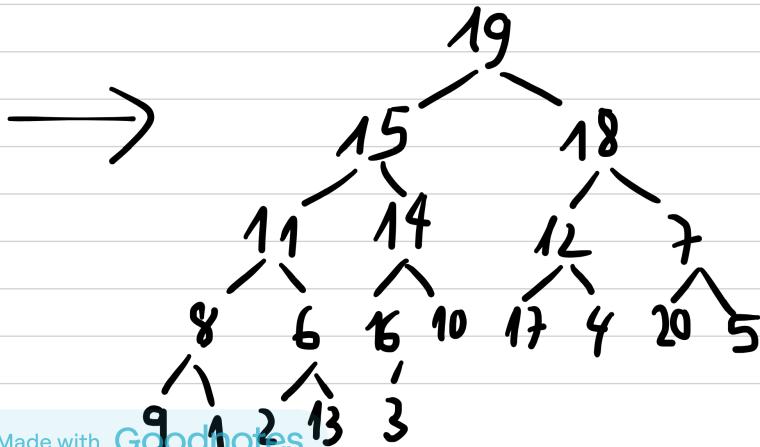
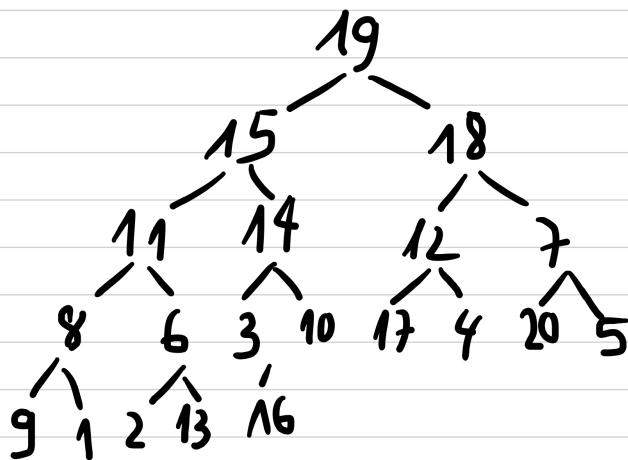
- Draw the heap (tree) from S2
- Insert elements from S1 to this heap one by one and draw the heap after each step.
- Write out the procedure to find and remove the maximum element from binary search tree **in detail**.

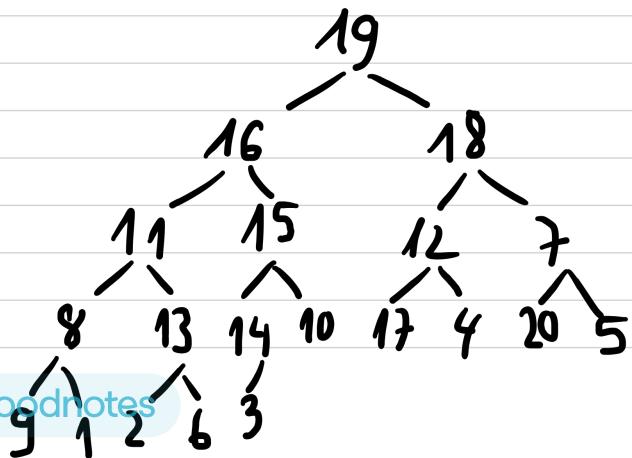
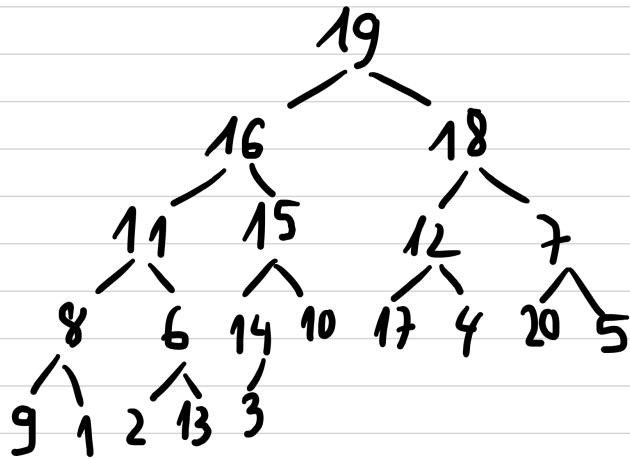
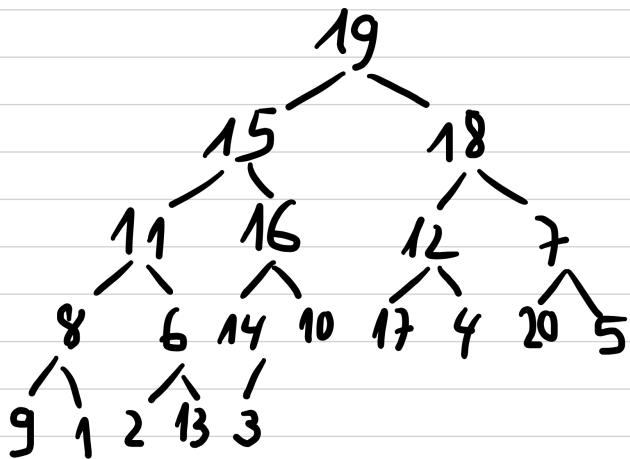
a)

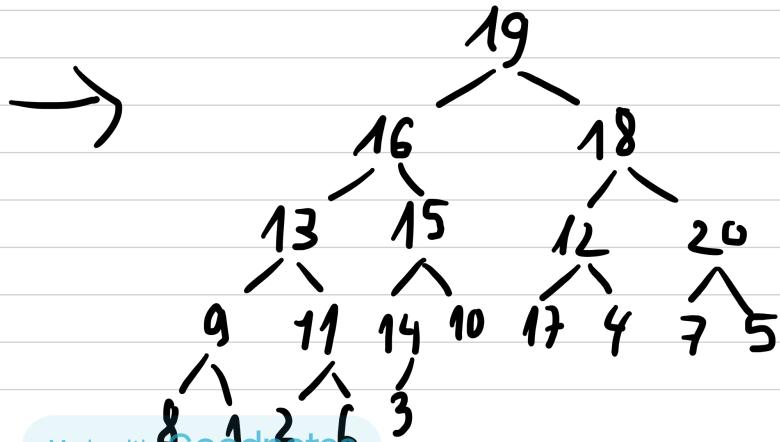
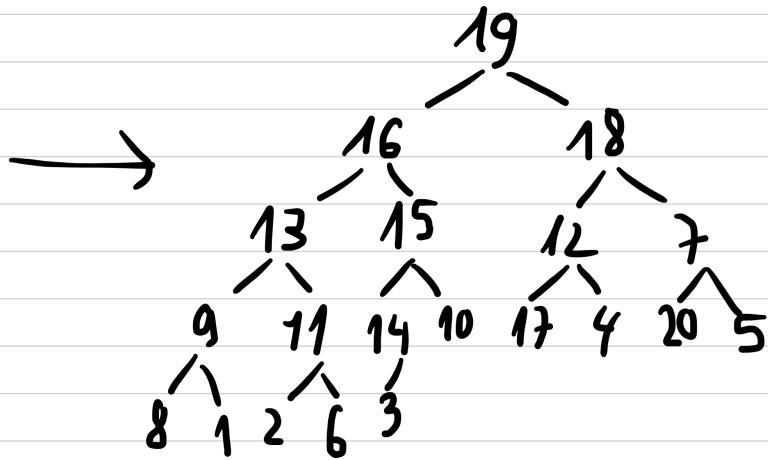
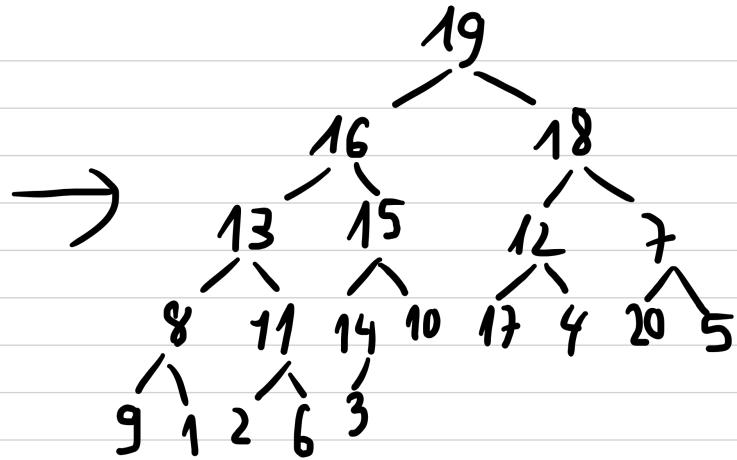


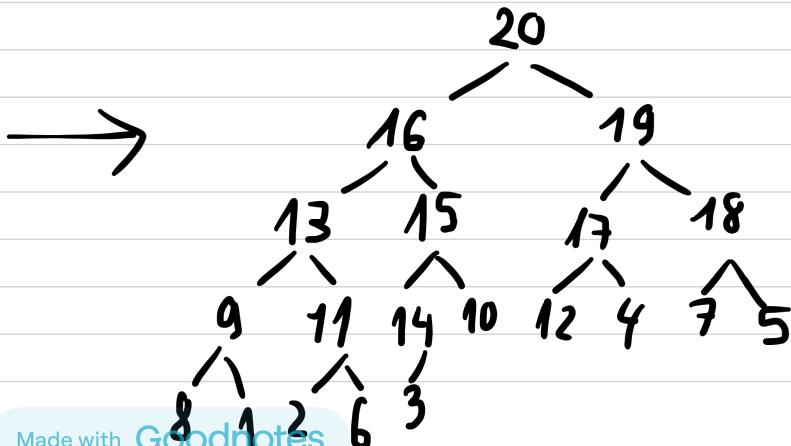
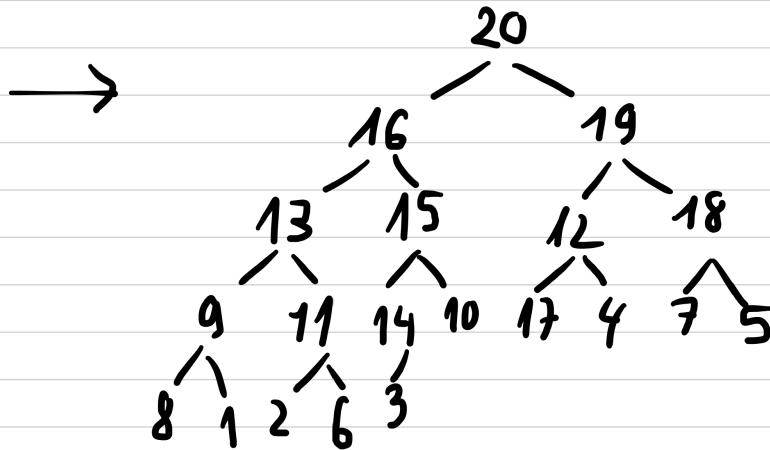
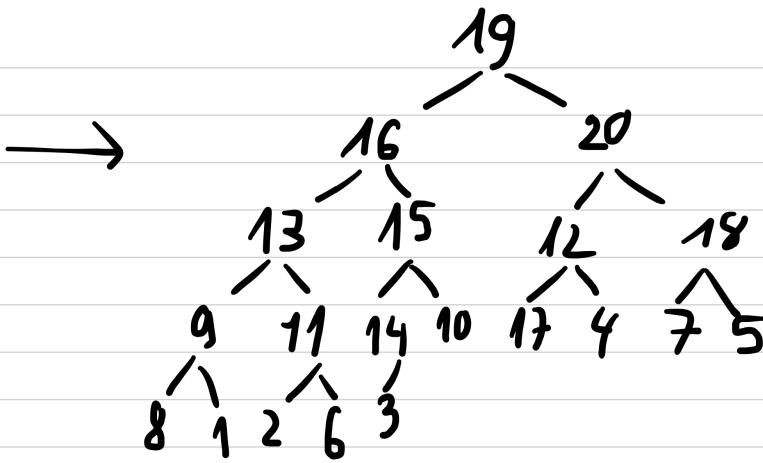


b)



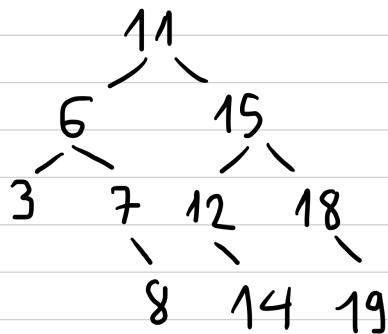






6

$$S2 = 6, 15, 7, 11, 3, 12, 18, 8, 19, 14$$



* Tìm max element

- Bắt đầu xét từ gốc 11, 11 có con phải nên ta xét node con phải là 15
- Với node 15, có con phải nên ta xét node con phải là node 18.
- Với node 18, có con phải nên ta xét node con phải là node 19
- Với node 19, không có con phải nên max element = 19.

* Remove max element

- Node 19 là lá nên ta chỉ cần delete node 19.

Ta được BST sau khi xóa node max như sau:

