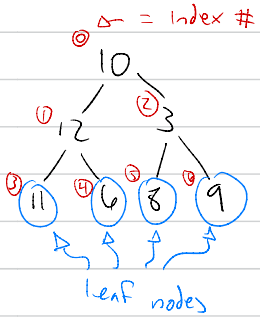
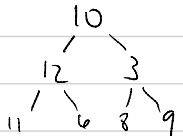
Part 4a)

* using optimized version which skips leaf nodes!!
* min Heap = smallest at Top.

Original:

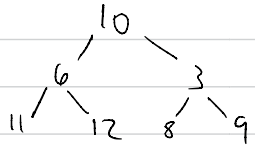


Step 1: heapify(2)



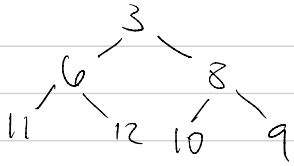
* Since 3 < 9, Tree stays The same

Step 2: heapify(1)



* Since 12 > 6, we swap The Two.

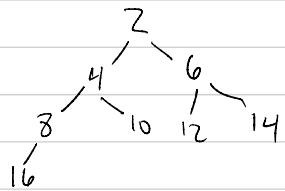
Step 3: heapify(0)



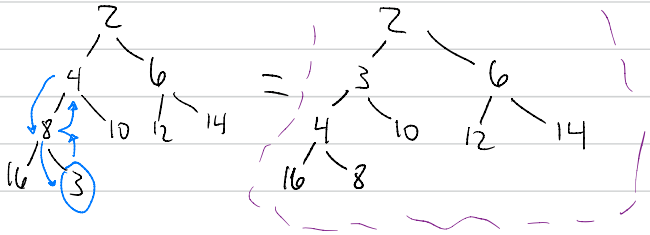
* Since 10 > 3, we swap The Two
* After This swap, Since 10 > 8, we swap The Two.

Part 4b)

1. Initial:



2. Insert(3)

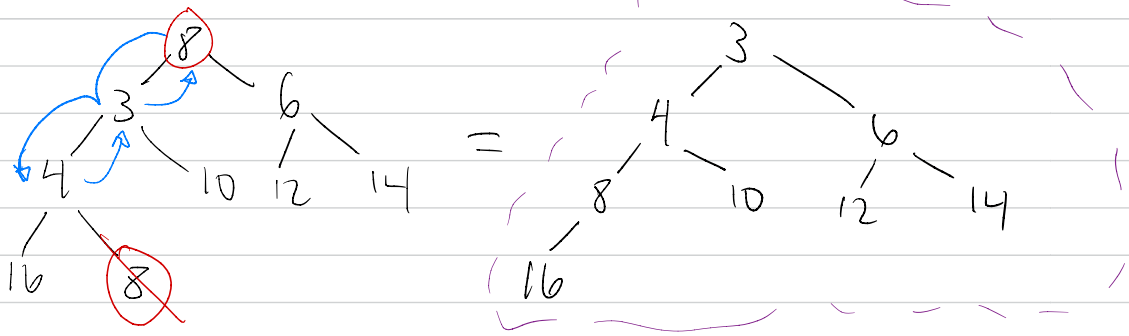


Answer

* Insert at end
* Trickle up → swap 3 and 8. Then swap 3 and 4.

3. Pop( )

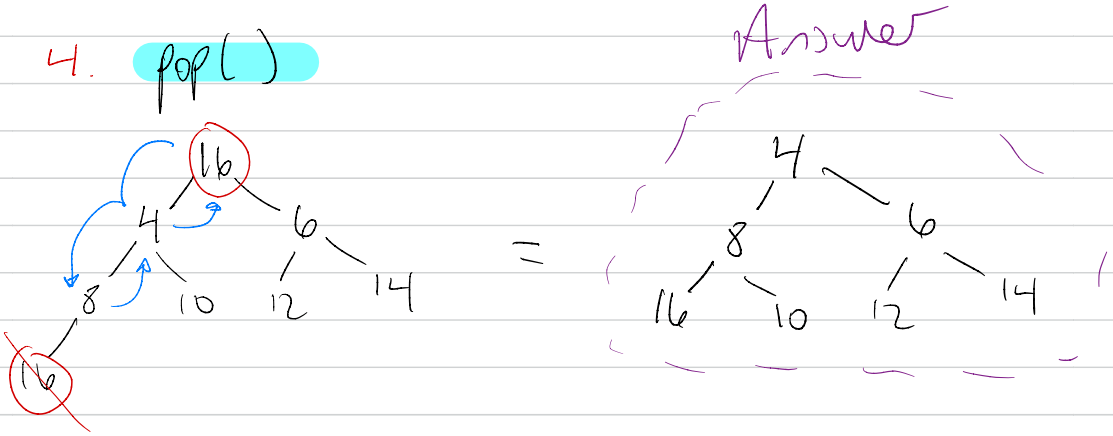
Answer



* Copy last item into first item
* Delete last index
* TrickleDown: Swap 8 and 3. Then swap 8 and 4.

4. pop( )

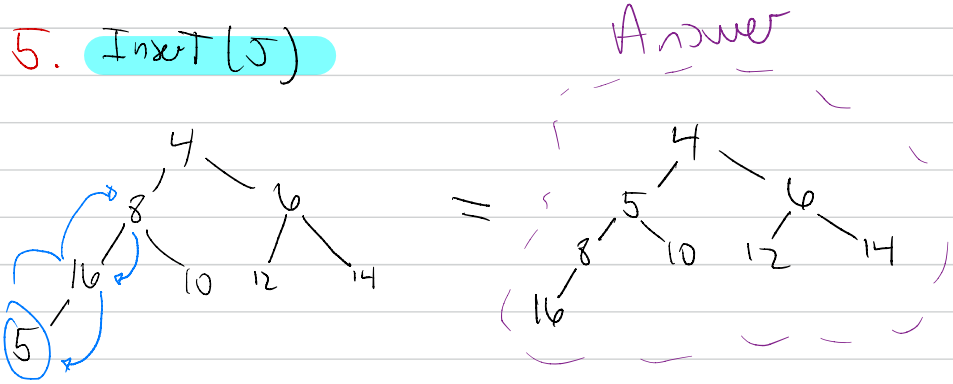
Answer



* Copy last item into first item
* Delete last index
* TrickleDown: Swap 16 and 4. Then swap 16 and 8.

5. Insert (5)

Answer



* Insert 5 at end
* TrickleUp: Swap 5 and 16. Then Swap 5 and 8.