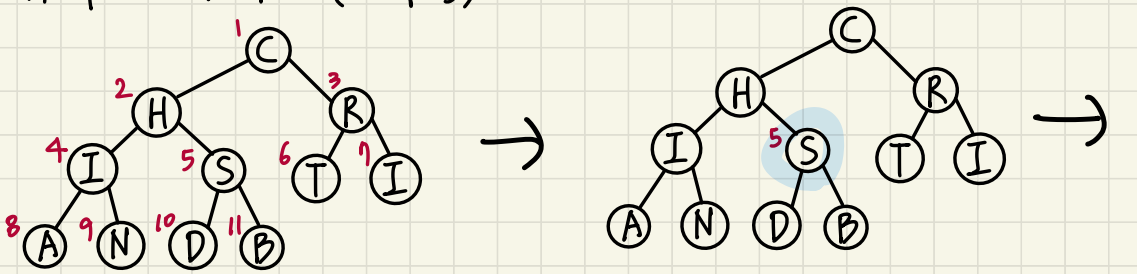
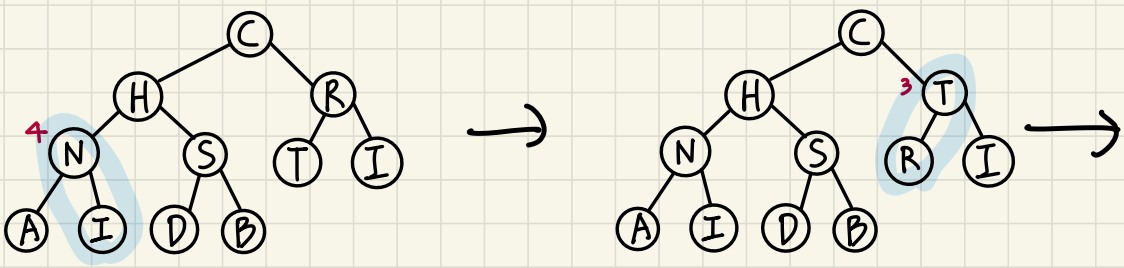
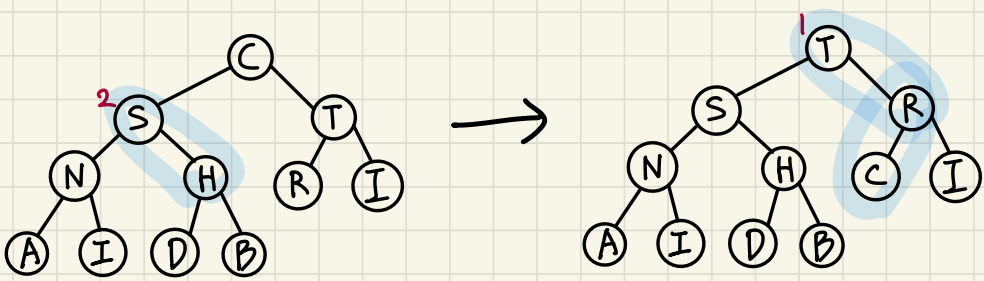
On my honor, I pledge that I have neither received nor provided improper assistance in the completion of this assignment. Signed: 조다빈 Student Number: 22000711

Heapsort – 1st Pass (heapify)



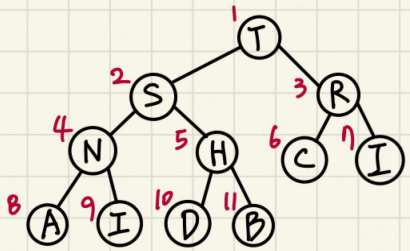
start at the last internal node

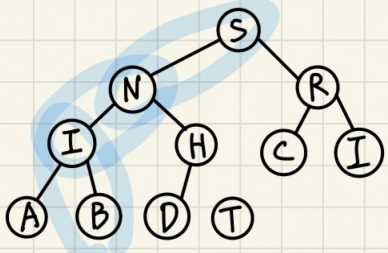


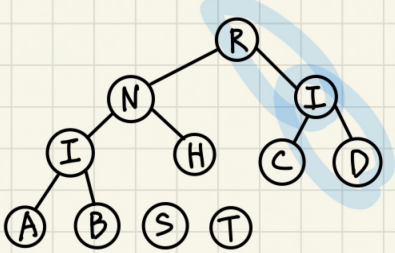


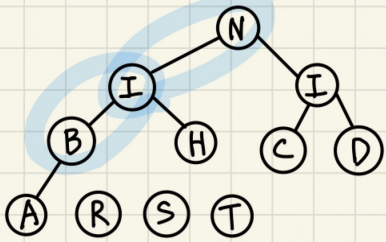
1st pass "D", 4 comparisons
"B", 2 comparisons

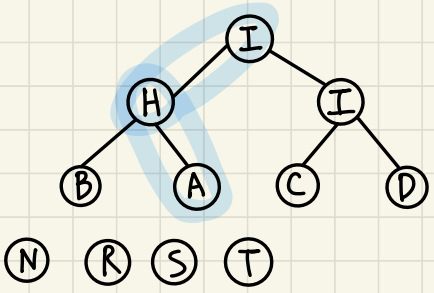
Heapsort – 2nd Pass

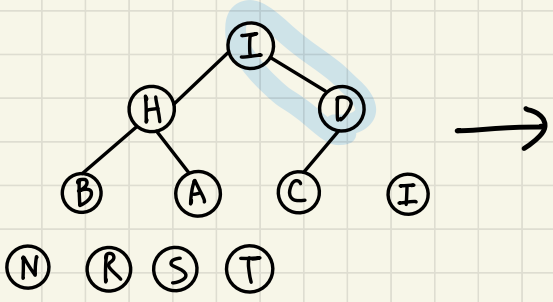


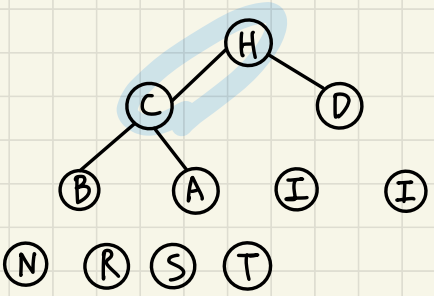


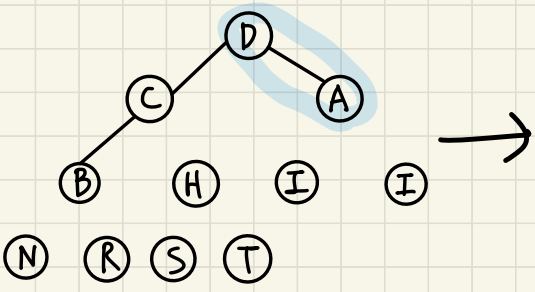


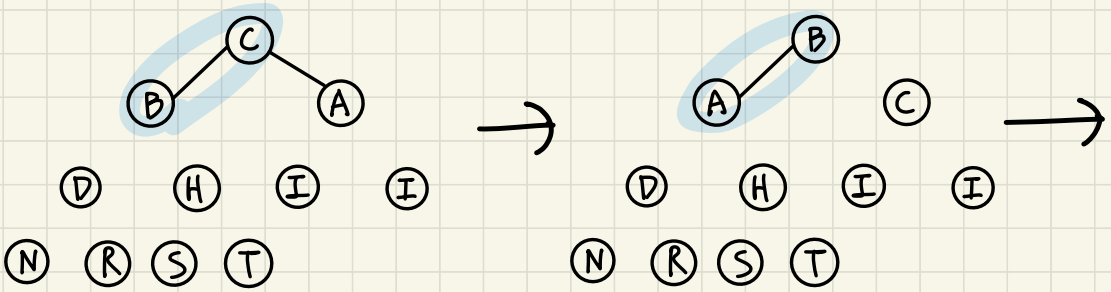


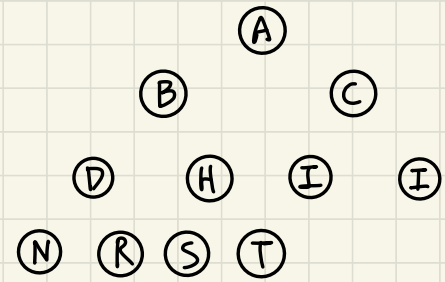












2nd pass: "D", 7 comparisons "B", 11 comparisons

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
Joyful Coding~~
sdbeen@MacBook-Pro-4 Pset13 % ./heapsortx
thequickbrownfoxjumpsoveralazydog.
Enter a word to sort: CHRISTIANDB
Input String:[ CHRISTIANDB ], N=11
Input  a[11]: C H R I S T I A N D B

ASCENDING:
1st pass(heapify - O(n)) begins:
   N=11 k=5 C H R I S T I A N D B
   N=11 k=4 C H R N S T I A I D B
   N=11 k=3 C H T N S R I A I D B
   N=11 k=2 C S T N H R I A I D B
   N=11 k=1 T S R N H C I A I D B
HeapOrdered: T S R N H C I A I D B
2nd pass(swap and sink - O(n log n) begins:
   N=10 k=1 S N R I H C I A B D
   N=9 k=1 R N I I H C D A B
   N=8 k=1 N I I B H C D A
   N=7 k=1 I H I B A C D
   N=6 k=1 I H D B A C
   N=5 k=1 H C D B A
   N=4 k=1 D C A B
   N=3 k=1 C B A
   N=2 k=1 B A
   N=1 k=1 A
a[11]: A B C D H I I N R S T

DESCENDING:
1st pass(heapify - O(n)) begins:
   N=11 k=5 A B C D H I I N R S T
   N=11 k=4 A B C D H I I N R S T
   N=11 k=3 A B C D H I I N R S T
   N=11 k=2 A B C D H I I N R S T
   N=11 k=1 A B C D H I I N R S T
HeapOrdered: A B C D H I I N R S T
2nd pass(swap and sink - O(n log n) begins:
   N=10 k=1 B D C N H I I T R S
   N=9 k=1 C D I N H S I T R
   N=8 k=1 D H I N R S I T
   N=7 k=1 H N I T R S I
   N=6 k=1 I N I T R S
   N=5 k=1 I N S T R
   N=4 k=1 N R S T
   N=3 k=1 R T S
   N=2 k=1 S T
   N=1 k=1 T
a[11]: T S R N I I H D C B A

Test the following with "CHRISITIAN__" with your initial at the end.
1. Now the array is sorted in descending order or a MAXHEAP.
2. Add the code to grow 'Z' in the MAXHEAP and show the result.
   Recall that you are dealing with a maxheap now!
3. Add the code to trim 'Z' in the MAXHEAP and show the result.
   Now make sure that the array is set as the MAXHEAP back.
grow: Z
   N=12 k=12 Z S T N I R H D C B A I
a[12]: Z S T N I R H D C B A I
trim: Z
   N=11 k=1 T S R N I I H D C B A
a[11]: T S R N I I H D C B A

Joyful Coding~~
sdbeen@MacBook-Pro-4 Pset13 %
```