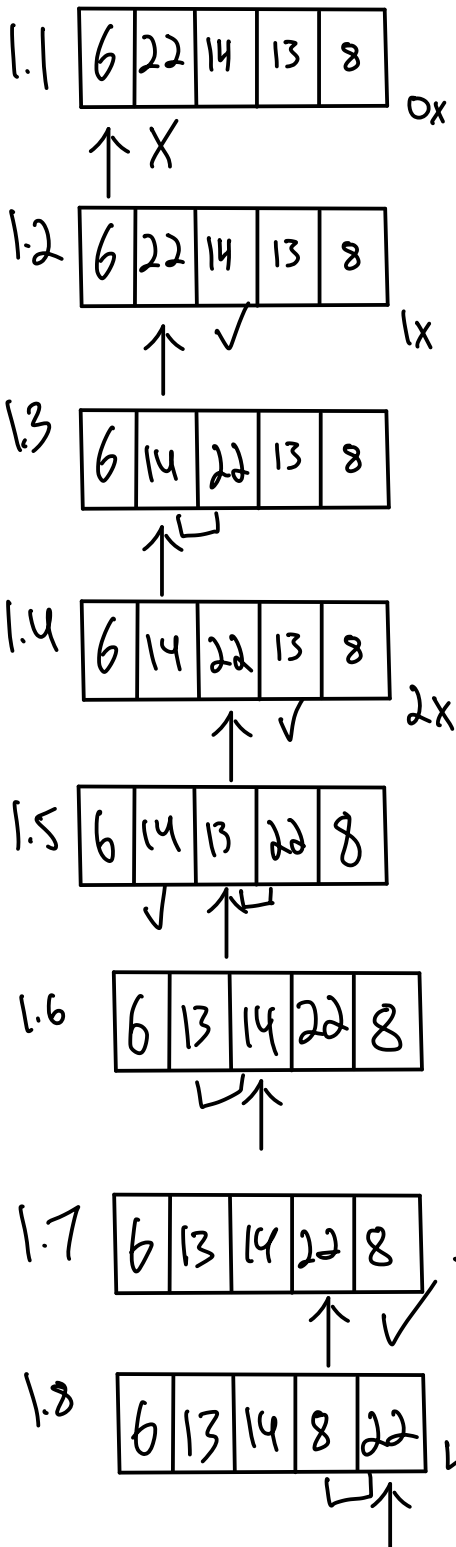
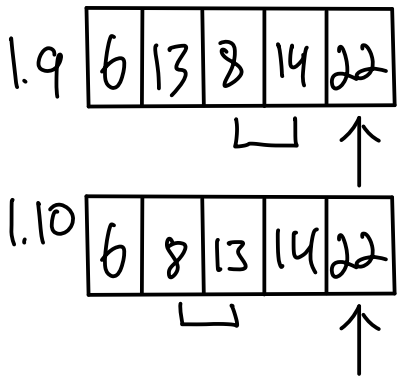
Josh
Clemens
5-9-23

Homework Sorting and Balancing

1. Use the insertion method to sort the data values 6, 22, 14, 13, and 8 **show every step, and drawing.**
2. Use the selection method to sort the data values 6, 22, 14, 13, and 8 **show every step, and drawing.**
3. Use the merge method to sort the data values 6, 22, 14, 13, and 8 **show every step, and drawing.**
4. Use the quicksort method to sort the data values 6, 22, 14, 13, and 8 **show every step, and drawing.**
5. Complete the Binary Search Tree using the AVL method to balance the binary tree for data values 6, 22, 14, 13, 8, 30, 1, and 4 make sure you **show every step, drawing, and balance of each node** every time you add a new element using the formula for balance $h_R - h_L$.

Insert Sort





$$T(n) = \frac{(n-1)(1+(n-1))}{2}$$

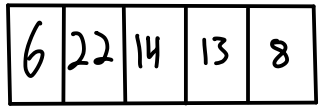
$$T(n) = \frac{(n-1)(n)}{2} = \frac{n^2}{2} - \frac{n}{2}$$

$$= O(n^2)$$

Selection Sort

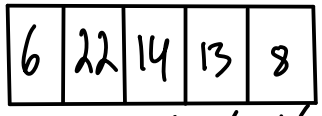
$O(n^2)$

2.1



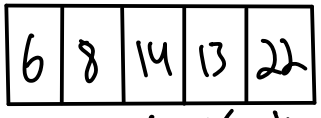
↑ X X X X 4x

2.2



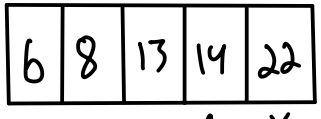
↑ ✓ ✓ ✓ 3x

2.3



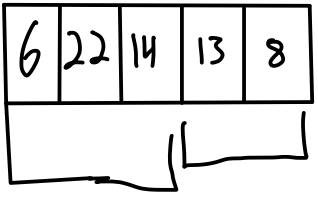
↑ ✓ X 2x

2.4



↑ X 1x

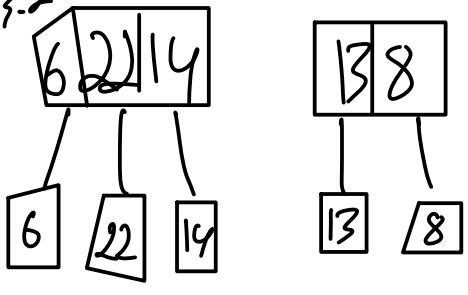
3.1



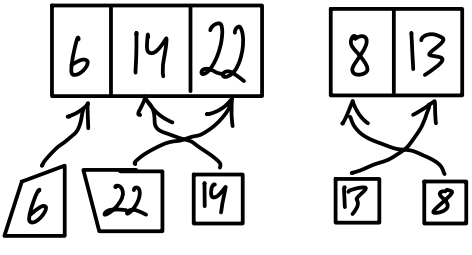
Merge Sort

$O(n \log n)$

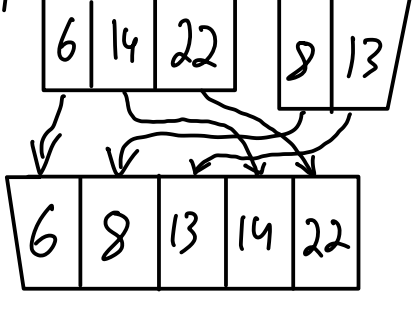
3.2



3.3

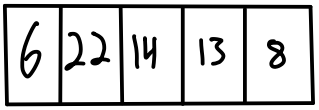


3.4



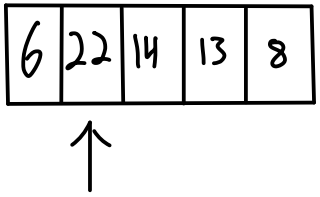
Quick Sort

4.1

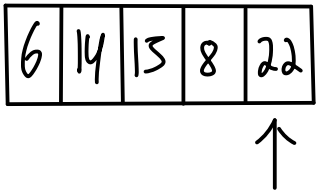


6 is smallest
no swap

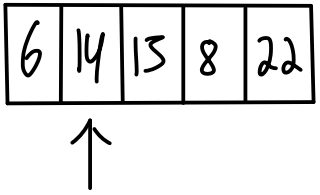
4.2



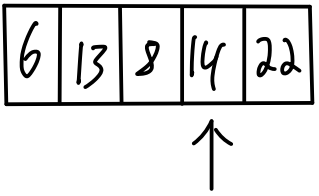
4.3



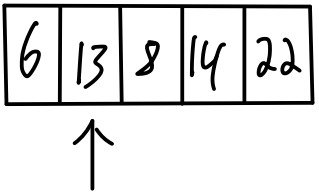
4.4



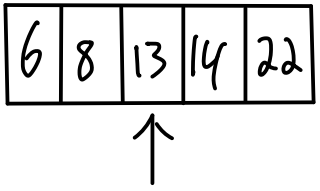
4.5



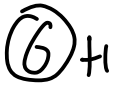
4.6



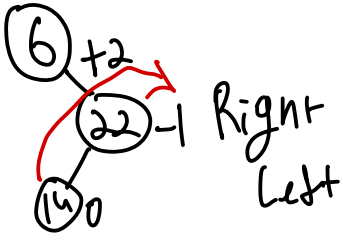
4.7

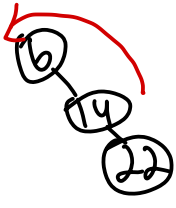


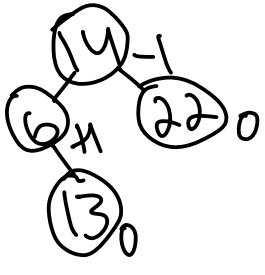
Binary search tree AVL balance
6, 22, 14, 13, 8, 30, 1, 4

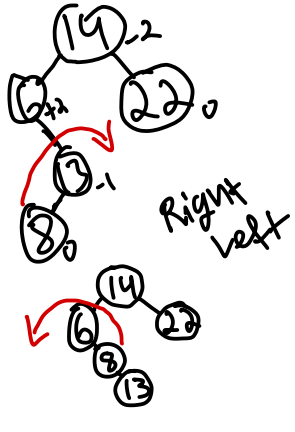
5.1 

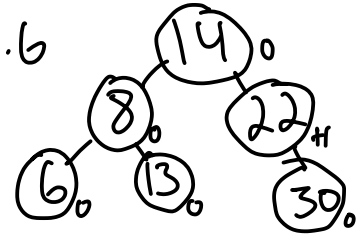
5.2. 

5.3 

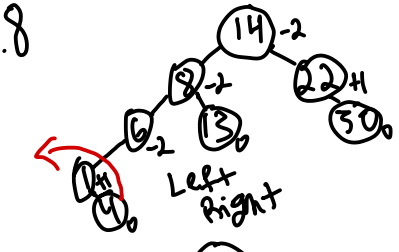


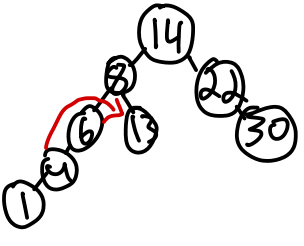
5.4 

5.5 

5.6 

5.7 

5.8 



5.9