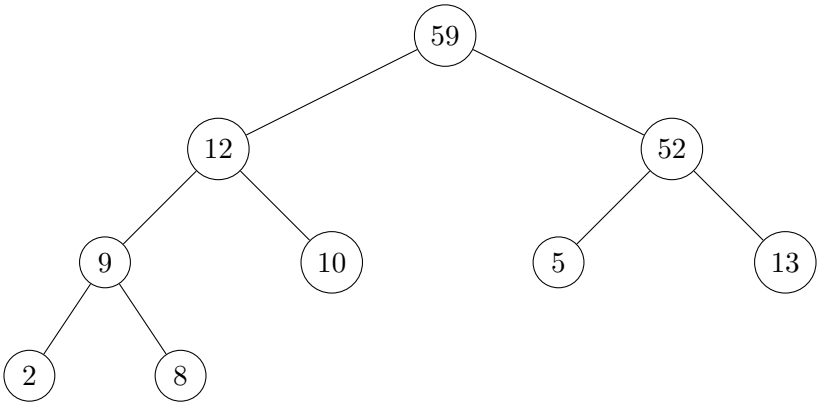
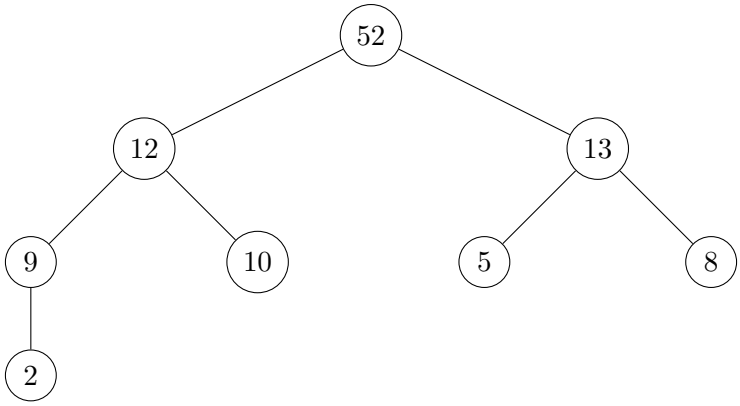
1.

a)



b)

you would remove 59 and replace it with 8 then heapify down until 8 settles into a spot.



2.

3.

a)

$$2(n-2)+1 = 2n-3$$

b)

```
B = Array[⌊log2n⌋+1][n]
B[0] = deepCopy(A)
c = ⌊n/2⌋
r = n%2
For i in range 1 to B.length{
   For j in range 0 to c{
      B[i][j] = B[i-1][2j] > B[i-1][2j+1] ? B[i-1][2j] : B[i-1][2j+1]
   }
   if(r == 1){
      B[i][c] = B[i-1][2c+1]
   }
   r = c%2
   c = ⌊c/2⌋
}
```