HW3

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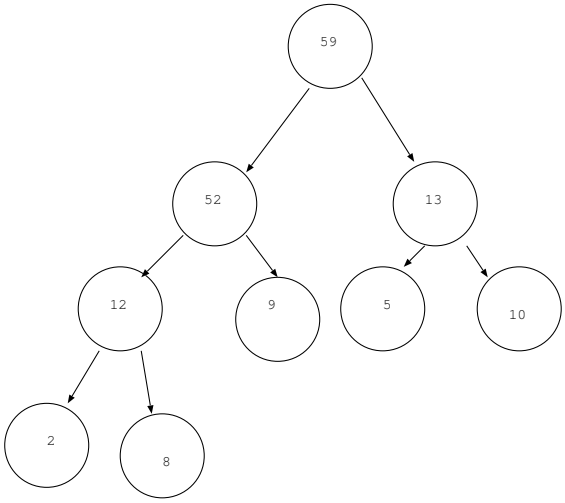
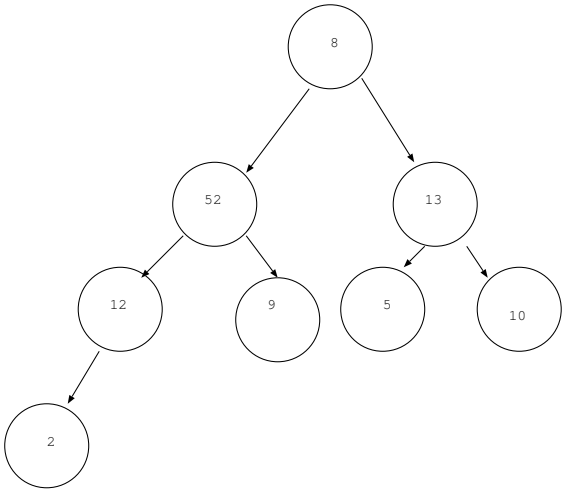
1. (a)

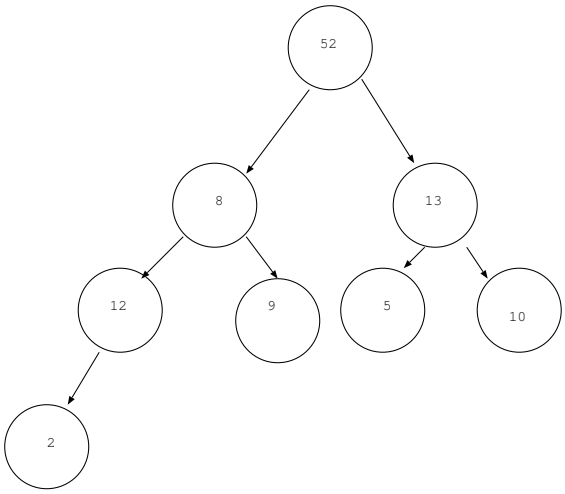


First we will replace the removed element with the last element in the tree

(b):

Then we must heapify the data structure

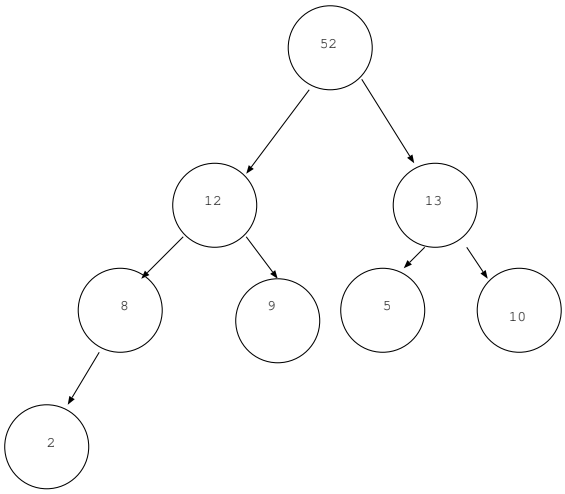




The max heap is now been heapified.

2. Solve the following recurrences. You can not use master theorem to solve them. You must show the steps in your derivation.

(a): If we draw out a 3 iterations then we would get



$[cn]_1 + [\frac{cn}{3} + \frac{2cn}{3}]_2]_2 + [\frac{cn}{9} + \frac{2cn}{9} + \frac{2cn}{9} + \frac{4cn}{9}]_3$
where the brackets represent the layers this can be reduced to $[cn]_1 + [cn]_2 + [cn]_3 + ...$ for all iterations. So now we just need to find the number of iterations. Every iteration divides n by 3 or by $\frac{2}{3}$. So there should be logarithmic number of iterations. So $T(n) = cnlog(n)$.