Homework 4

Problem 2:

a) $T(n) = 36\,T(n/6) + 2n$

$a=36,\ b=6,\ \log_b a = 2,\ f(n)=2n,\ n^{\log_b a} = n^2$

$f(n) \in O(n^{2-\varepsilon})$ for some $\varepsilon = 1$ (case 1).

Hence, $T(n) \in \Theta(n^2)$. (Master theorem)

b) $T(n) = 5\,T(n/3) + 17\,n^{1,2}$

$a=5,\ b=3,\ \log_b a = 1,46,\ f(n)=17.n^{1,2},\ n^{\log_b a} = n^{1,46}$

$f(n) \in O(n^{1,46-\varepsilon})$ for $\varepsilon = 0,26$ (case 1)

Hence, $T(n) \in \Theta(n^{1,46})$.

c) $T(n) = 12\,T(n/2) + n^2 \log n$

$a=12,\ b=2,\ \log_b a = 3.585,\ n^{\log_b a} = n^{3,585},\ f(n) = n^2 \log n$

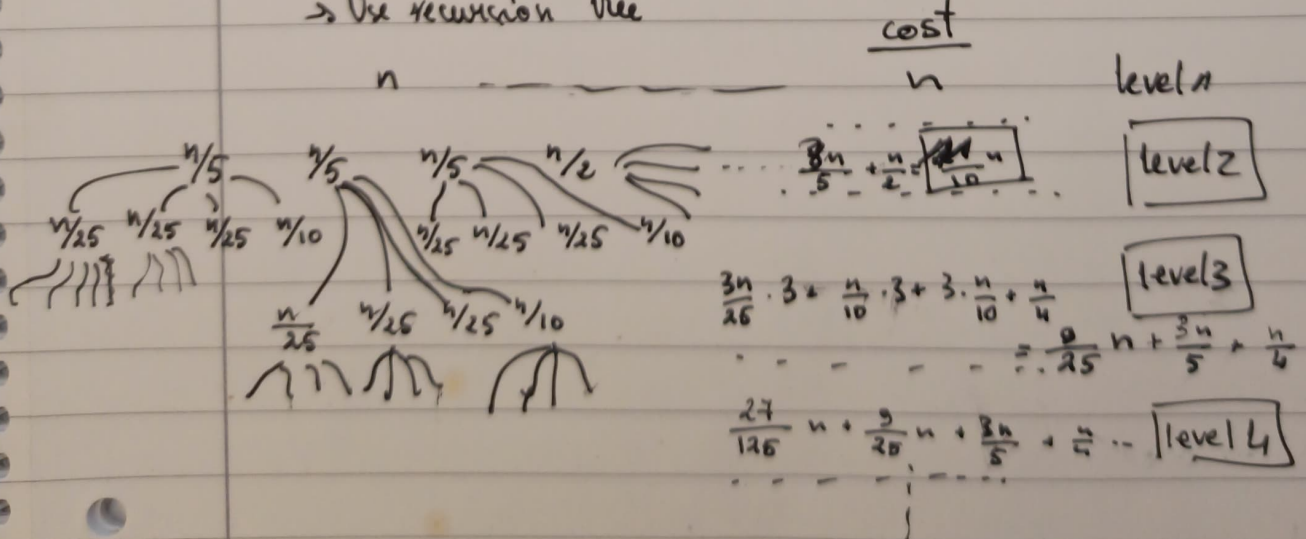
Here we are in case 1 since $n^{3,585}$ ~~is~~ $n^2 \log n$.

($n^{3,585}$ is polynomially larger than $f(n)$ for some value $\varepsilon > 0$)

Hence $T(n) \in \Theta(n^{3,585})$.

d) $T(n) = 3\,T(n/5) + T(n/2) + 2^n$.

→ Use recursion tree



as we go further in the levels, the cost decreases, Hence n is the biggest cost. We Conclude $T(n) = \Theta(2^n)$