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Listex 6

1)a- $\begin{cases} \Theta(1) \\ T(n) = 2T(n/2) + \Theta(n) \end{cases}$

1. chute: $n \lg n$
2. $T(n) \leq c.n \lg n$
3. $T(n) = 2((c.n/2) \cdot \lg(n/2)) + 1$
4. $T(n) \leq ((c.n/2) \cdot \lg(n/2)) + 1$
   $T(n) \; c.n \lg n - \lg 2 + 1$
   $T(n) \; \underbrace{c.n \lg n} - c.n + 1$
5. maior termo

$\begin{cases} T(1) = 1 \\ T(n) = 2T((n/2) + 17) + n \end{cases}$

1. chute: $n \lg n$
2. $T(n) \leq c.n \lg n$
3. $T(n) = 2((c.n/2) \cdot \lg(n/2) + 17) + n$
4. $T(n) \leq ((c.n/2) \cdot \lg(n/2) + 17) + n$
   $T(n) = (c.n \cdot \lg n - \lg 2 + 34) + n$
   $T(n) = \underbrace{c.n \cdot \lg n} - c.n + 34 + n$
5. maior termo

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Listex 6

1)b - $\begin{cases} T(1) = 1 \\ T(n) = 2T(n/2) + 2 \end{cases}$

1. $T(n) = 2T(n/2) + 2$
2. passo: $n/2$
3. $T(n/2) = 2T(n/4) + 2$
   $T(n/4) = 2T(n/8) + 2$
4. $T(n) = 2(2(n/4) + 2) + 2$
   $\cdot\ 2^2((n/4) + 2^2) + 2$
   $(2^2(n/4) + 2^3 - 2)$
   $T(n) = 2^2(2(n/8) + 2) + 2^2 + 2$
   $\cdot\ 2^3((n/8) + 2^2) + 2^2 + 2$
   $(2^2(n/8) + 2^4 - 2)$
5. $2^i(n/2^i) + 2^{i+1} - 2$
6. $T(n/2^i) = T(1)$
   $n/2^i = 1$
   $2^i = n$
   $i = \lg n$
7. $2^{\lg n}(n/2^{\lg n}) + 2^{\lg n + 1} - 2$
   $2^{\lg n} T(1) + 2^{\lg n + 1} - 2$
   $n + 2n - 2$
   $T(n) = 3n - 2$
8. $T(n) \in \Theta(n)$
9. $T(n) = 3n - 2$
   $2(3n - 2) + 2$
   $2(3n/2 - 2) + 2$
   $2.3n/2 - 2.2 + 2$
   $3n - 4 + 2$
   $3n - 2 \rightarrow$ caso indutivo correto

9. $T(1) = 3n - 2 = 1$
   $T(1) = 3.1 - 2 = 1$
   $T(1) = 3 - 2 = 1$
   $T(1) = 1 \rightarrow$ caso base correto

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Listexe 6

1)b- $\begin{cases} T(1)=1 \\ T(n)=2T(n-1)+1 \end{cases}$

1. $T(n)=2T(n-1)+1$
2. passo: $n-1$
3. $T(n-1)=2(n-2)+1$
   $T(n-2)=2(n-3)+1$
4. $T(n)=2(2(n-2)+1)+1$
   $2^2(n-2)+2+1$
   $2^2(n-2)+2^2-1$
   $T(n)=2^2(2(n-3)+1)+2+1$
   $2^3(n-3)+2^2+2+1$
   $2^3(n-3)+2^3-1$
5. $2^i(n-i)+2^i-1$
6. $T(n-i)=T(1)$
   $n-i=1$
   $i=n-1$
7. $2^{n-1}(n-1)+2^{n-1}-1$
   2^n-1
8. $T(n) \in \Theta(2^n)$
9. $T(2^n)=T(1)$
   $2^n-1=1 \rightarrow$ Caso base correto

$T(2^n)=T(n)$
$2(2^{n-1}-1)+1$
2^n-2+1
$2^n-1 \rightarrow$ Caso indutivo correto

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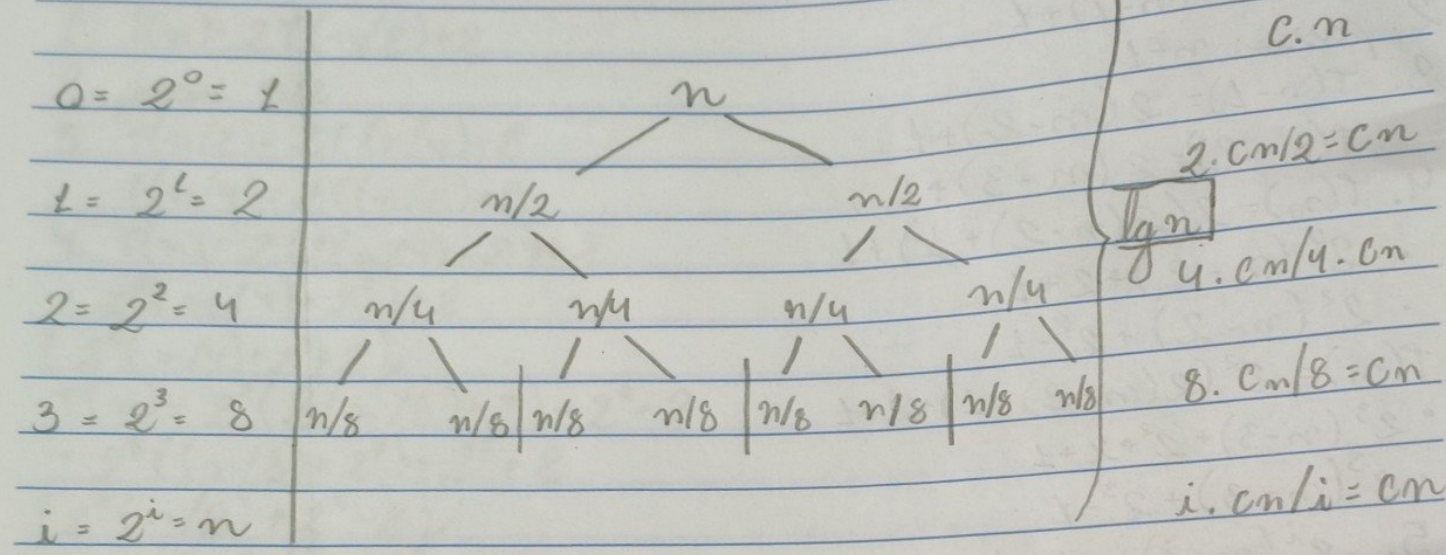
Lista 6

1)c- $\begin{cases} T(1) = 1 \\ T(n) = 2T(n/2) + c.n \end{cases}$



$2^i = n$
$\lg 2^i = \lg n$
$i = \lg n$ (Ln $(\lg n = \lg_2 n)$
É a altura

$c.n.(\lg n + 1)$
$T(n) = c.n.\lg n + c.n$
$T(n) = n \lg n$
É a complexidade.

Jandaia

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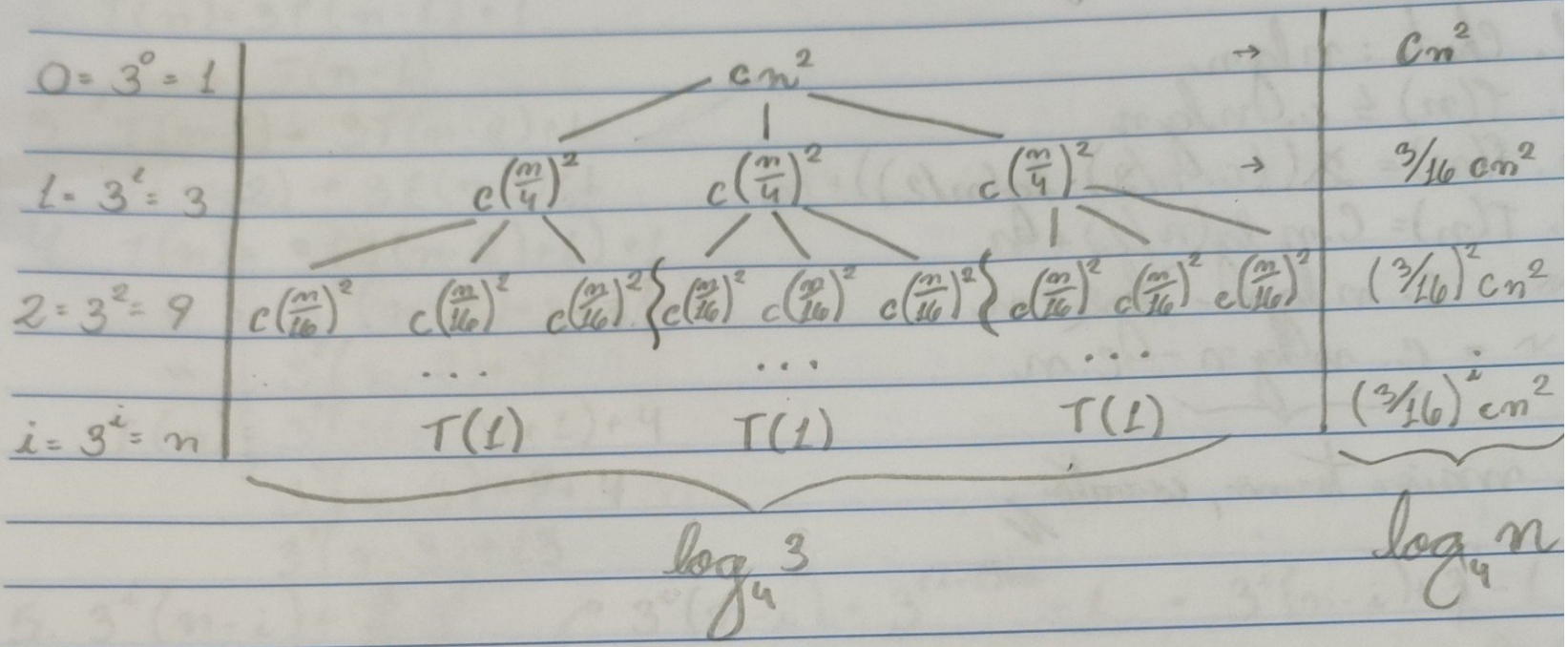
Listex 6

1) c- $\begin{cases} T(n) = \Theta(1) \text{ se } n = 1, 2, 3 \\ T(n) = 3T(n/4) + c.n^2 \text{ se } n \geq 1 \end{cases}$



Complexidade = $O(n^2)$