|C| rayo =
1 1

$$= 7^{k} \cdot \quad + \frac{C(7^{k-1}-1)}{7-1}$$

$$= 7^{\log_3 n} + \frac{C(7^{\log_3 n-1}-1)}{6} =$$

$$= 7^{\log_3 n} + \frac{C\, 7^{\log_3 n-1}}{6} - \frac{C}{6}$$

$$= 7^{\log_3 n} + \frac{C}{6} \cdot \left(3^{\log_3 7}\right)^{\log_3 n-1}$$

$$7^{k} \cancel{\cdot} T(n/3^{k}) + \sum_{i=0}^{k-1} 7^{i} \cdot C\left(\frac{n^{k}}{3^{i}}\right)^{2}$$

$$= 7^{k} T(n/3^{k}) + Cn^{2} \sum \frac{7}{(3^{2})^{i}}$$

$$q = \frac{7}{9}$$

correções

No momento que eu abro a recursão no ex 1C) eu estava fazendo errado, o correto seria

$T(n)\ 7T(n/3) + Cn^2$

$T(n) = 7\left(7T(n/3^2) + C\left(\frac{n}{3^2}\right)^2\right) + Cn^2 = 7^2T(n/3^2) + 7C\left(\frac{n}{3}\right)^2 + Cn^2$

$\vdots$

$= 7^k T(n/3^k) + Cn^2 \sum_{i=0}^{k-1} 7^i \left(\frac{1}{3^i}\right)^2 \Rightarrow q = \frac{7}{9}$

a PG terá soma $\Rightarrow S = \frac{\overset{a_1}{1}\left(\left(\frac{7}{9}\right)^k - 1\right)}{\frac{7}{9} - 1}$

$= 7^k T(n/3^k) + Cn^2 \frac{7/9^k - 1}{-\frac{2}{9}} =$

$= 7^k T(n/3^k) + Cn^2 \frac{-9}{2}\left(\frac{7}{9}^k - 1\right) \Rightarrow$ para $k = \log_3 n$

$7^{\log_3 n}\cancel{T}(n/n) + Cn^2 \frac{-9}{2}\left(\frac{7^{\log_3 n}}{(3^2)^{\log_3 n}} - 1\right) =$

$= 7^{\log_3 n} + n^2C\left(\frac{-9}{2}\right)\left(\frac{7^{\log_3 n}}{n^3} - 1\right) =$

$= 7^{\log_3 n} + \left(\frac{-9C}{2n}\right)7^{\log_3 n} + \frac{Cn^2 9}{2} \Rightarrow$

escrevendo 7 como $3^{\log_3 7}$, temos:

$\cancel{7^{\log_3 n}}$

$7^{\log_3 n} + \left(\frac{-9c}{2n}\right) 7^{\log_3 n} + \frac{9}{2} cn^2$

$\Rightarrow 7^{\log_3 n} + \left(\frac{-9c}{2n}\right) n^{\log_3 7} + \frac{9}{2} Cn^2$

$= O(n^2) \rightarrow$ fórmula fechada:

$\boxed{7^{\log_3 n} + \left(\frac{-9c}{2n}\right) n^{\log_3 7} + \frac{9}{2} Cn^2}$

Não tenho certeza se os contas dão isso mesmo.

1d) $T(n) = 2T\left(\frac{n}{2}\right) + Cn^3$

$= 2T(n/2) + Cn^3$

$= 2\left(2T(n/2^2) + C\left(\frac{n}{2}\right)^3\right) + cn^3 = 2^2 T(n/2^2) + 2C\left(\frac{n}{2}\right)^3 + Cn^3$

$= 2^2\left(2T(n/2^3) + C\left(\frac{n}{2^2}\right)^3\right) + 2C\left(\frac{n}{2}\right)^3 + Cn^3$

$2^3 T(n/2^3) + 4C\left(\frac{n}{2^2}\right)^3 + 2C\left(\frac{n}{2}\right)^3 + Cn^3$

$\vdots$

$2^k T(n/2^k) + Cn^3 \sum_{i=0}^{k-1} 2^i \left(\frac{1}{2^i}\right)^3$

$= 2^k T(n/2^k) + Cn^3 \dfrac{\left(\frac{2}{8}\right)^k - 1}{\frac{2}{8} - 1} \Rightarrow$

$$2^k T(n/2^k) + \sum_{i=0}^{k-1} 2^i c\left(\frac{n}{2^i}\right)^3$$

$$2^k T(n/2^k) + Cn^3 \sum_{i=0}^{k-1} 2^i \cdot \left(\frac{1}{2^i}\right)^3$$

$$\Rightarrow 2^k T(n/2^k) + \left(\frac{1 \cdot \left(\frac{1}{4}\right)^{k} - 1}{\frac{1}{4} - 1}\right) Cn^3$$

$$= 2^k T(n/2^k) + \left(\frac{\left(\frac{1}{4}\right)^k - 1}{-\frac{3}{4}}\right) Cn^3$$

para $k = \lg n$, temos

$$= 2^{\lg n} \cancel{T(n/n)}^{1} + \left(-\frac{4}{3}\right) \cdot \left(\left(\frac{1}{4}\right)^{\lg n} - 1\right) Cn^3$$

$$= \cancel{2^{\lg n}}_{n} + \left(\frac{1}{n^2} - 1\right)^{-4/3} Cn^3$$

$$\Rightarrow n + \left(\frac{-4}{3}\right) \cdot \frac{1}{n^2} \cdot Cn^3 + \frac{4}{3} Cn^3$$

$$= n - \frac{4}{3} Cn + \frac{4}{3} Cn^3$$