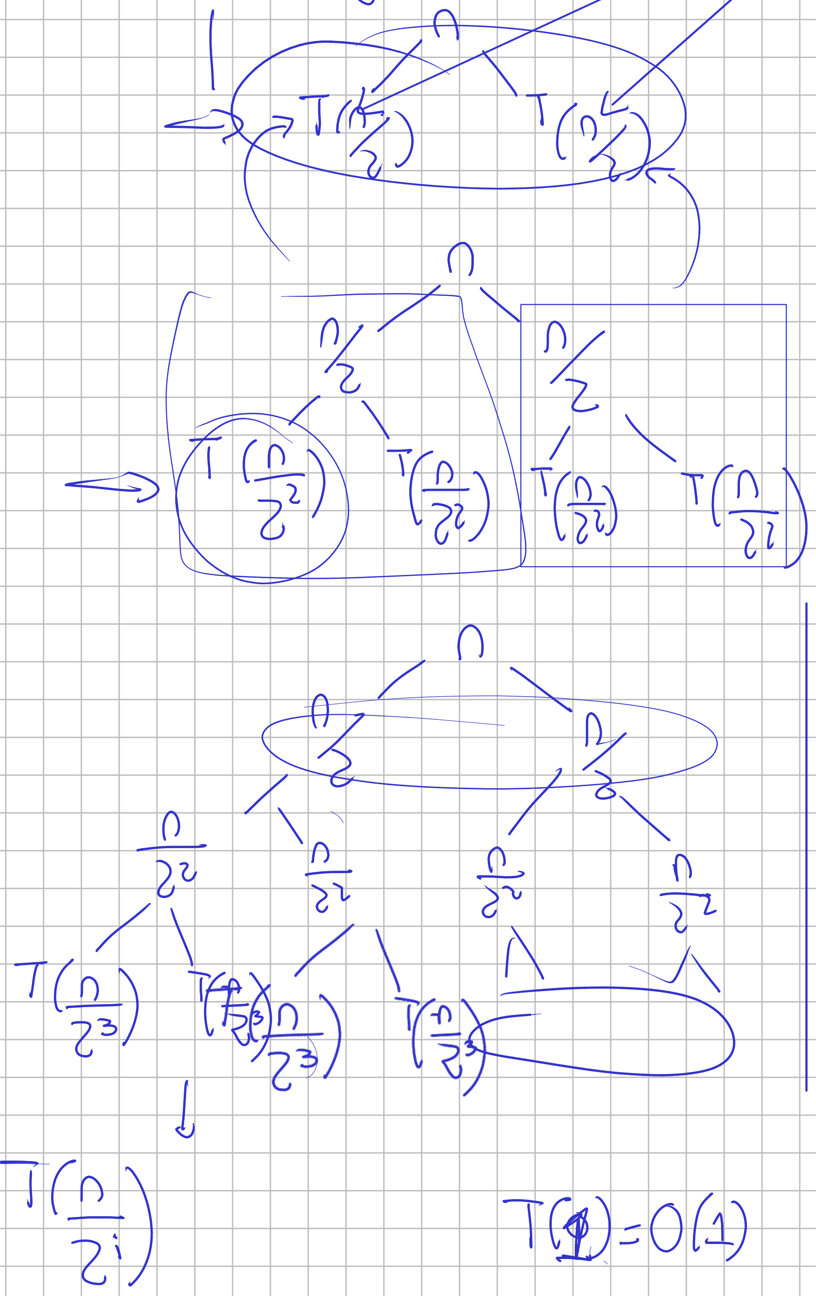
T(n) = cT(n/2) + f(n)
Divide y vencerás

$$T(n) = 2T(n/2) + n$$

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

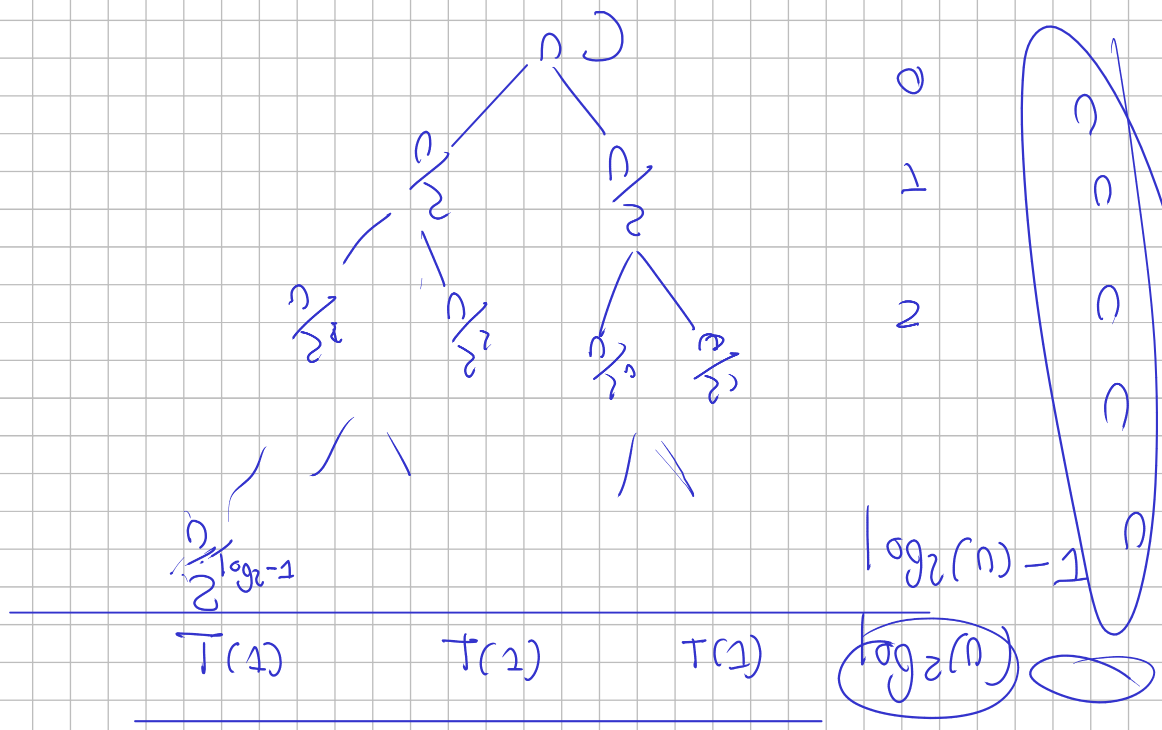


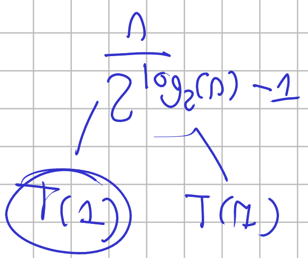
h	n
0	n
1	n
2	n
3	n
i	$O(1) = c$
	$\log_2(n)$

$$T(1) = O(1)$$

$$\frac{n}{2^i} = 1 \qquad n = 2^i \qquad \log_2(n) = \log_2(2^i)$$

$$\log_2(n) = i$$





$$T(n) = \sum_{i=1}^{\log_2(n)-1} n + T(1) \times 2^{\log_2(n)}$$

$$T(n) = n(\log_2(n) - 1) + T(1)\, n$$

$$\boxed{T(n) = n\log_2(n) - n + c \times n}$$

$$\boxed{O(n\log_2(n))}$$

Dado $T(n) = aT(n/b) + f(n)$, donde $a \geq 1$, $b > 1$, se puede acotar asintóticamente como sigue:

1. $T(n) = \Theta(n^{\log_b a})$

Si $f(n) = O(n^{\log_b a - \varepsilon})$ para algún $\varepsilon > 0$

2. $T(n) = \Theta(n^{\log_b a} \lg n)$

Si $f(n) = \Theta(n^{\log_b a})$ para algún $\varepsilon > 0$

3. $T(n) = \Theta(f(n))$

Si $f(n) = \Omega(n^{\log_b a + \varepsilon})$ para algún $\varepsilon > 0$ y si $af(n/b) \leq cf(n)$ para algun $c < 1$

$T(n) = 2T\left(\frac{n}{2}\right) + n \qquad a = 2 \qquad b = 2 \qquad f(n) = n$

1) n es $O(n^{\log_2 2 - \epsilon})$

n es $O(n^{1-\epsilon}) \qquad \epsilon > 0 \qquad \times$

2) n es $\Theta(n^{\log_2 2})$

n es $\Theta(n)$

$\Theta(n^{\log_b a} \log(n))$

$\boxed{\Theta(n \log(n))}$

$T(n/2) + 1$

$T(1) = 1$