Laboratorio 4

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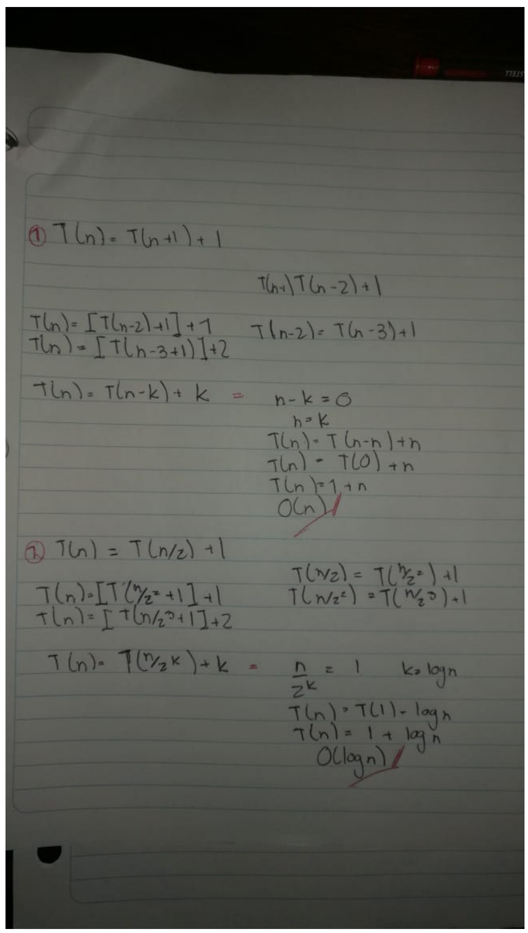
1 Metodo Sustitucion



① $T(n) = T(n+1) + 1$

$T(n-1)\ T(n-2)+1$

$T(n) = [T(n-2)+1] + 1$ $\quad T(n-2) = T(n-3)+1$

$T(n) = [T(n-3+1)] + 2$

$T(n) = T(n-k) + k =$

$n-k=0$

$n=k$

$T(n) = T(n-n)+n$

$T(n) = T(0)+n$

$T(n) = 1+n$

$O(n)$

② $T(n) = T(n/2) + 1$

$T(n/2) = T(n/2^2)+1$

$T(n/2^2) = T(n/2^3)+1$

$T(n) = [T(n/2^2+1)]+1$

$T(n) = [T(n/2^3+1)]+2$

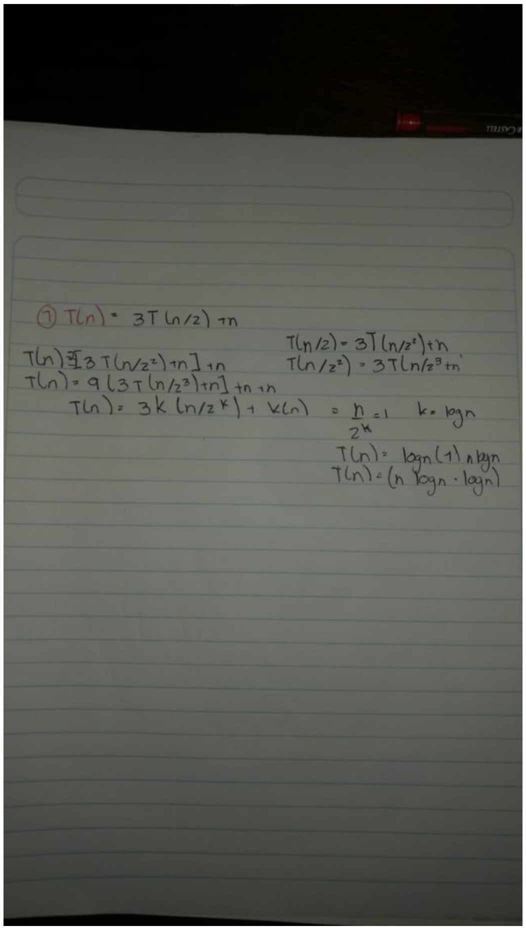
$T(n) = T(n/2^k)+k =$ $\quad \frac{n}{2^k} = 1 \quad k = \log n$

$T(n) = T(1) + \log n$

$T(n) = 1 + \log n$

$O(\log n)$

2 Metodo Arbol Recursivo



1 $T(n) = 3T(n/2) + n$

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

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

$T(n) = 3[3T(n/2^2) + n] + n$

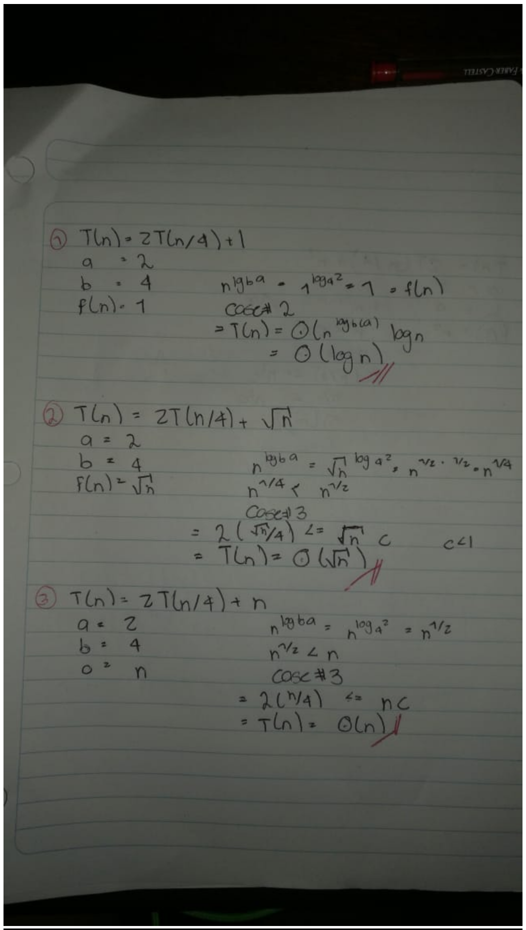
$T(n) = 9[3T(n/2^3) + n] + n + n$

$T(n) = 3k(n/2^k) + k(n)$ $= \frac{n}{2^k} = 1$ $k = \log n$

$T(n) = \log n (1)\, n \log n$

$T(n) = (n \log n \cdot \log n)$

3 Metodo Maestro



(1) $T(n) = 2T(n/4) + 1$

$a = 2$

$b = 4$

$f(n) = 1$

$n^{\log_b a} = 1^{\log_4 2} = 1 = f(n)$

case# 2

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

$= \Theta(\log n)$ //

(2) $T(n) = 2T(n/4) + \sqrt{n}$

$a = 2$

$b = 4$

$f(n) = \sqrt{n}$

$n^{\log_b a} = \sqrt{n}^{\log_4 2} = n^{1/2 \cdot 1/2} = n^{1/4}$

$n^{1/4} < n^{1/2}$

Case# 3

$= 2(\sqrt{n}/4) <= \sqrt{n}\, c \qquad c<1$

$= T(n) = \Theta(\sqrt{n})$ //

(3) $T(n) = 2T(n/4) + n$

$a = 2$

$b = 4$

$o = n$

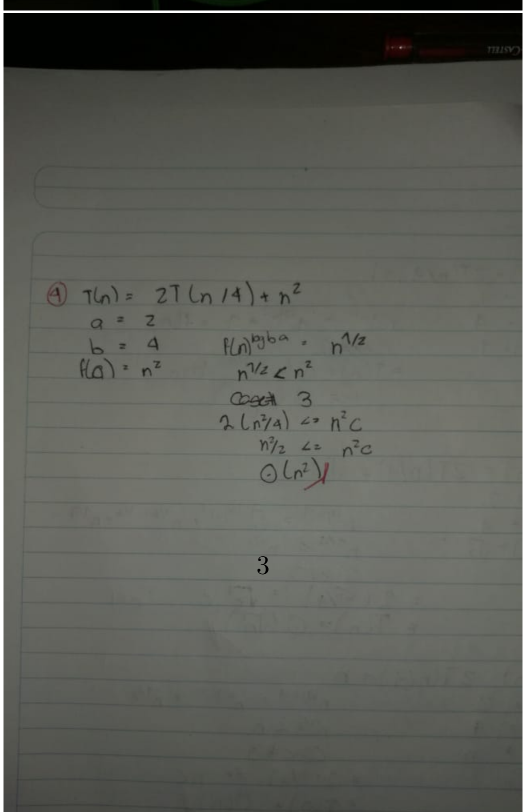
$n^{\log_b a} = n^{\log_4 2} = n^{1/2}$

$n^{1/2} < n$

case #3

$= 2(n/4) <= nc$

$= T(n) = \Theta(n)$ //



(4) $T(n) = 2T(n/4) + n^2$

$a = 2$

$b = 4$

$f(a) = n^2$

$f(n)^{\log_b a} = n^{1/2}$

$n^{1/2} < n^2$

Case# 3

$2(n^2/4) <= n^2 c$

$n^2/2 <= n^2 c$

$\Theta(n^2)$ //