Parte 1

Taller: Método Maestro

① $T(n) = 4 \cdot T(n/2) + O(n^2)$ $\qquad T(n) = a \cdot T(n/b) + f(n)$

$a = 4$
$b = 2$
$d = 2$ $\qquad b^d = 4 = 2^2$

Caso 2 : $a = b^d$

$T(n) = O(n^d \log n)$

Identifica los valores de a, b y f(n).

R//: $a = 4$
$b = 2$
$f(n) = O(n^2)$

Compara f(n) con $n^{\log_b a}$.

R//: $n^{\log_b a} = n^{\log_2 4}$ $\qquad 2^2 = 4, \log_2 4 = 2$

$n^{\log_b a} = n^2$

Ambos son $O(n^2)$,

Caso 2

Determina la complejidad final T(n).

R//: $f(n) = \Theta(n^{\log_b a})$

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

$T(n) = \Theta(n^2 \cdot \log n)$

② $T(n) = 3T(n/3) + O(n)$ $\quad\quad$ $T(n) = a \cdot T(n/b) + f(n)$

$a = 3$
$b = 3$
$d = 1$ $\quad\quad$ $b^d = 3$

Caso 2: $a = b^d$

$T(n) = O(n^d \log n)$

Identifica los valores de a, b y f(n)

R//: $a = 3$
$b = 3$
$f(n) = O(n)$

Compara f(n) con $n^{\log_b a}$

R//: $n^{\log_b a} = n^{\log_3 3}$ $\quad\quad$ $\overset{b^d}{3^1} = 3$, $\log_3 3 = 1$

$n^{\log_b a} = n^1 = n$

Ambos son $O(n) \to$ Caso 2

Determina la complejidad final T(n)

R//: $f(n) = \Theta(n^{\log_b a})$

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

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

③ $T(n) = 5T(n/2) + O(n \log n)$ $\quad\quad$ $T(n) = a.T(n/b) + f(n^d)$

$a = 5$
$b = 2$
$d = 1$

Caso 1 $\quad a > b^d$

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

Identifica los valores de a, b y $f(n)$

R//: $a = 5$
$b = 2$
$f(n) = O(n \log n)$

Compara $f(n)$ con $n^{\log_b a}$

R//: $n^{\log_b a} = n^{\log_2 5}$ $\quad\quad$ $2^1 = 2$, $\log_2 5 = 2,32$

$n^{\log_b a} = n^{2,32}$

$f(n) = O(n \log n)$ y $n^{\log_b a} = \Theta(n^{2,32})$

$f(n) = O(n \log n) < n^{\log_b a}$ $\quad\quad 1,32 > 0$

$O(n \log n) = O(n^{2,32 - 1,32}) = O(n^1)$

Caso 1

Determina la complejidad final $T(n)$

R// Caso 1: $T(n) = \Theta(n^{\log_b a})$

$T(n) = \Theta(n^{\log_2 5})$ $\quad\quad$ $T(n) \approx \Theta(n^{2,32})$