Name: _____ Login: _____ HW04 Master theorem − v1.1

Case 1: $T(n)$ is $\Theta\left(n^{\log_b a}\right)$ if $f(n)$ is $\mathcal{O}(n^d)$ and $d < \log_b a$.

Algorithm − Give the name as shown in the assignment page.

_____

Recurrence tree − Draw ≥3 levels, including the root. Root should be labelled T(n) = "running time to _____ of size n."

a = ____ because _____.

b = ____ because _____.

f(n) is the time to _____.

f(n) is _____ because _____.

Express as O(…), Ω(…), or Θ(…) in terms of only n (not a, b, or d).

d = ____ $\log_b a$ = ____ Recurrence relation: _____

"T(n) = ▒T(▒) + f(n), where f(n) is ▒(▒)." Express in terms of only n (i.e., not a, b, or d).

T(n) is Θ(_____)

Simplified, in terms of only n (not a, b, or d).

Name: Login: HW04 Master theorem − v1.1

Case 2: $T(n)$ is $\Theta\left(n^{\log_b a} \log n\right)$ if $f(n)$ is $\Theta(n^d)$ and $d = \log_b a$ (or any of the variants of Case 2).

Algorithm − Give the name as shown in the assignment page.

Recurrence tree − Draw ≥3 levels, including the root. Root should be labelled T(n) = "running time to _____ of size n."

a = because .

b = because .

f(n) is the time to .

f(n) is because .

Express as O(…), Ω(…), or Θ(…) in terms of only n (not a, b, or d).

d = $\log_b a$ = Recurrence relation:

"T(n) = ▒T(▒) + f(n), where f(n) is ▒(▒)." Express in terms of only n (i.e., not a, b, or d).

T(n) is Θ( )

Simplified, in terms of only n (not a, b, or d).

Name: Login: HW04 Master theorem − v1.1

Case 3: $T(n)$ is $\Theta(f(n))$ if $f(n)$ is $\Omega(n^d)$ and $d > \log_b a$.

Algorithm − Give the name as shown in the assignment page.

Recurrence tree − Draw ≥3 levels, including the root. Root should be labelled T(n) = "running time to _____ of size n."

a = because .

b = because .

f(n) is the time to .

f(n) is because .

Express as O(…), Ω(…), or Θ(…) in terms of only n (not a, b, or d).

d = $\log_b a$ = Recurrence relation:

"T(n) = ▒T(▒) + f(n), where f(n) is ▒(▒)." Express in terms of only n (i.e., not a, b, or d).

T(n) is Θ( )

Simplified, in terms of only n (not a, b, or d).

Name: Login: HW04 Master theorem − v1.1

Credits

List any resources you used and how you used them. Include links we gave you, as well as any that you found on your own. If you used ChatGPT, give a link to the chat (if your account allows that) and describe how it helped you and/or what you learned from it. This page is an exercise in academic integrity (i.e., giving attribution), and for our own understanding.

Case 1: *(name of algorithm)*

Case 2: *(name of algorithm)*

Case 3: *(name of algorithm)*

