

Tamir Krief, Iaian Milton, Blessing Abumere
COSC 336
9/26/2024

Assignment 3

Exercise 1.

(a) $T(n) = 3T(\frac{n}{4}) + 3$. $a = 3$, $b = 4$, $f(n) = 3$. $n^{\log_4 3}$ vs. 3 . $n^{\log_4 3}$ is the winner because $f(n) = 3$ is a constant function and doesn't grow. Therefore the Theta evaluation for the recurrence is $T(n) = \Theta(n^{\log_4 3})$.

(b) $T(n) = 2T(\frac{n}{2}) + 3n$. $a = 2$, $b = 2$, $f(n) = 3n$. $n^{\log_2 2}$ or n vs. $3n$. This is a tie because $f(n) = 3n$ has proportional growth to n . Therefore the Theta evaluation for the recurrence is $T(n) = \Theta(n \log n)$.

(c) $T(n) = 9T(\frac{n}{3}) + n^2$. $a = 9$, $b = 3$, $f(n) = n^2$. $n^{\log_3 9}$ or n^2 vs. n^2 . This is a tie because both functions are equivalent. Therefore the Theta evaluation for the recurrence is $T(n) = \Theta(n^2 \log n)$.

Exercise 2:

- (a) $T(n) = \Theta(2^n)$
- (b) $T(n) = \Theta(n)$
- (c) $\Theta(n \log n)$
- (d) $\Theta(n)$

Programming Task.