

David Johnson
 Data Structures & Algorithms
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7. $T(n) = 10T(n/5) + n^3$

$T(n) = aT(n/b) + f(n)$

$a = 10$

$b = 5$

$f(n) = n^3$

Python

import math

$\log_2 10 = \text{math.log}(10)$

$\log_2 5 = \text{math.log}(5)$

$\log_2 \text{base_change} = \log_2 10 / \log_2 5$

Print (log_2 base_change)

$n^{3.0} = n^{\log_2 10} \approx n^{2.10}$

$f(n) = n^3$ is smaller than $n^{2.10} = \text{base 1}$

$T(n) = \Theta(n^{2.10})$

8. $T(n) = 2T(n/3) + 1, T(1) = 1$

$T(n) = aT(n/b) + f(n)$

$a = 2, n \log_3 2 = n^{\log_3 2} \approx n^{1.11}$

$b = 3$

$f(n) = 1 = n^0$ $f(n)$ is smaller than $n^{1.11} = \text{base 1}$

$T(n) = \Theta(n^{\log_3 2})$

Python

import math

$\log_2 2 = \text{math.log}(2)$

$\log_2 3 = \text{math.log}(3)$

$\log_2 \text{base_change} = \log_2 2 / \log_2 3$

Print (log_2 base_change)