Homework 4. Recurrence Equations

Due by: October 11th, by the end of the class.

[10] Solve exactly the following recurrence equation:

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

[10] Solve the following recurrence for \( n \geq 2 \) such that \( n = 3^k \) for some \( k \):

\[ T(n) = 9T(n/3) + n^3, \quad T(1) = 1. \]

Give the exact solution and its big-oh approximation.

[10] Prove that \( T(n) \) defined as (you may assume that \( n = 2^k \) for some \( k \))

\[ T(n) = 2T(n/2) + 2n \log_2 n \quad ; \quad T(2) = 4 \]

satisfies \( T(n) = O(n \log^2 n) \).

[10] Solve exactly the following recurrence with \( T(1) = 1 \) and for \( n \geq 2 \)

\[ T(n) = \sum_{i=1}^{n-1} T(i) + 1. \]