[40] 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:

$$T(n) = 9T(n/3) + n^3, \qquad T(1) = 1.$$

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 $n \geq 2$

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