COMPSCI H311 Spring 2020 - Homework 3

Released: Wednesday 19 February 2020. Due: Tuesday 25 February in class

List your collaborators if any. The writeup you present must be your own work in presentation, and you must acknowledge all sources of aid other than course staff and course material.

1. A second-order recurrence

Find a closed form for the recurrence $x_0 = 0$, $x_1 = 1$, $x_{n+1} = x_n + 2x_{n-1} + 4^n + n$, for $n > 1$. Use generating functions or assume a certain form (taking into account the homogeneous equation and the extra terms), and find the coefficients.

2. Asymptotic bound

Consider the recurrence $T(1) = 1$, $T(n) = 2T(n/2) + \frac{1}{4} \cdot 2^{\frac{2T(n/2)}{n}}$ for $n >= 2$. (To simplify reasoning, you may assume n is a power of 2). Find a tight asymptotic bound for $T(n)$.