Homework Assignment 4
CS 330 Discrete Structures
Spring Semester, 2015

Due: Friday, March 13, 2015

1. Solve the following problems using the operator method discussed in class and given in the notes:
   (a) Page 511, exercise 12
   (b) Page 525, exercise 28
   (c) Page 526, exercise 40

   If the roots of the recurrence are not integers, just get the form of the solution in each case for symbolic roots, together with the simultaneous equations that determine the coefficients.

2. Solve the following problems using secondary recurrences together with the operator method discussed in class and given in the notes:
   (a) Page 536, exercise 36
   (b) Derive all three cases of the Master Theorem on page 532 (we did part of this in class).
   (c) In the notes, the recurrence $T(n) = \sqrt{n} \cdot T(\sqrt{n}) + n$ is solved by a recursion tree (page 13 of the notes) and again by the "guess-and-confirm" method in section 1.6.3. Solve it by means of a secondary recurrence (section 1.5.3), together with the operator method.

3. (a) Prove that $1/89 = 1/10^2 + 1/10^3 + 2/10^4 + 3/10^5 + 5/10^6 + 8/10^7 + \cdots$. (Hint: $89 = 10^2 - 10 - 1$).
   (b) What reciprocal plays the same role base 8? Prove it.

Just for fun (no credit given), solve the crossword puzzle on the back of this page and explain all of the “theme” words and the squares that are circled.
This document contains a crossword puzzle titled "Crossword". The puzzle is edited by Will Shortz. The instructions state that when the puzzle is completed, the circled letters can be connected by a curved line to spell a two-word phrase appropriate to this puzzle’s theme. The crossword is organized into rows and columns with clues for each cell. The puzzle includes answers and instructions for obtaining answers, including calling a toll-free number or using an online subscription service. The document also includes an answer to previous puzzle and a note about the daily crossword puzzle theme. The document is part of a homework assignment for CS 330—Spring, 2015.