CS371 - Programming Assignment #4

Due Date: 7.01.2017

Question 1

Suppose you are given three strings of characters: X, Y and Z where $|X| = n$, $|Y| = m$, and $|Z| = n + m$. Z is said to be a shuffle of X and Y iff Z can be formed by interleaving the characters from X and Y in a way that maintains the left-to-right ordering of the characters from each string.
Give an efficient dynamic-programming algorithm that determines whether Z is a shuffle of X and Y. Hint: The values of the dynamic programming matrix you construct should be Boolean, not numeric.
Class name has to be Shuffler and it has to have a method named as isShuffle which takes three Strings as input; X, Y and Z respectively and returns Boolean value.

Question 2

Write a program that computes the percentage of red nodes in a given red-black BST. Test your program by running at least 100 trials of the experiment of inserting N random keys into an initially empty tree, for N = 10^4, 10^5, and 10^6, and plot the results. X-axis should be N and Y-axis should be average percentage of red nodes after 100 trials for each N. Class name should be PlotRBT.

Details:

Submit your assignment by 23:59 on the due date through LMS. All input and output naming is strict. You have to send your work with the zip utility and name your file as `StudentId_Name_Surname_ProgrammingAssignment4.zip`. Assignments must be done individually. We will not tolerate any act that may be interpreted as plagiarism, and

in such cases, you will be referred to the university ethical committee. Do not walk in randomly (especially on the last day) into your TA's or the instructor's offices. Make an appointment first. This is important. Your TA's have other responsibilities. Please respect their personal schedules!