Homework 1

Due Date: Feb. 7, 2019

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(1) **(15 pts)** Write a recursive method to determine if a character is in a list of characters in O(logN) time. Mathematically prove *(as we did in class)* that T(N) = O(logN). You can assume that this list is sorted lexicographically.

(2) **(20 pts)** Write a function that determines if a string has the same number of 0's and 1's using a stack. The function must run in O(N) time. *You can assume there already exists a stack class and can just use it*

(3) **(30 pts)** Write a method to determine if a positive integer, N, is prime in $O(\sqrt{N})$.

(4) **(15 pts)** Given a list of numbers from [1-100] with one number missing, determine which number is missing in O(N) time using basic arithmetic and a max of two new variables *The original list does not count as one of the two variables.*

(5) **(20 pts)** Write a method to determine if a string has matching parenthesis for the set of all parenthesis {},(),[] using only one stack.