

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 $O(\log N)$ time. Mathematically prove (*as we did in class*) that $T(N) = O(\log N)$. 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 $[0-100]$ 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.