CS222 Homework 4

Exercises for Algorithm Design and Analysis by Li Jiang, 2016 Autumn Semester

1. Given a non-empty integer array, find the minimum number of moves required to make all array elements equal, where a move is incrementing a selected element by 1 or decrementing a selected element by 1.

   You may assume the array's length is at most 10,000.

   Example:

   Input: [1,2,3]

   Output: 2

   Explanation:

   Only two moves are needed (remember each move increments or decrements one element):

   $[1, 2, 3] => [2, 2, 3] => [2, 2, 2]$

   Input:

   int A[]: the input array.

   int N: length of A.

   Output:

   int minMoves.

2. Given a string that consists of only uppercase English letters, you can replace any letter in the string with another letter at most k times. Find the length of a longest substring containing all repeating letters you can get after performing the above operations.

   Note:Both the string's length and k will not exceed 104.

   Example:

   Input:

   s = ”AABABBA”, k = 1

   Output:

   4

   Explanation:

   Replace the one 'A' in the middle with 'B' and form ”AABBBBA”. The substring ”BBBB” has the longest repeating letters, which is 4.

   Input:

   string s;

   int k;

   Output:

   return the length of the longest substring.

3. You are given an array x of n positive numbers. You start at point (0,0) and moves x[0] metres to the north, then x[1] metres to the west, x[2] metres to the south, x[3] metres to the east and so on. In other words, after each move your direction changes counter-clockwise.

   Write a one-pass algorithm with O(1) extra space to determine, if your path crosses itself, or not.

   Example 1:

   Given x = [2, 1, 1, 2]

   Return true (self crossing)

   Example 2:

   Given x = [1, 2, 3, 4]

   Return false (not self crossing)

   Example 3:

   Given x = [1, 1, 1, 1]

   Return true (self crossing)

   Input:

   int x[]: the input array.

   int N: length of x.

   Output:

   return true or false.