



Computer Science Olympiad
Pennsylvania State University
Hazleton Campus
Spring 2014

Deadline: March 31, 2014

Problem 1. [LSS - Longest Sorted Substring] A string s is a *sorted substring* of a given string str if there exists a sequence indexes $k_0, k_1, k_2, \dots, k_{m-1}$ such that:

- $0 \leq k_0 < k_1 < k_2 < \dots < k_{m-1} < n$
- $s[0] = str[k_0], s[1] = str[k_1], \dots, s[m-1] = str[k_{m-1}]$
- $s[0] \leq s[1] \leq s[2] \leq \dots \leq s[n-1]$

where m is the length of the string s , and n is the length of the string str , $m \leq n$. All characters of the string str are lower case letters [a – z].

Write a program to find *LSS* of a given string.

Input data:

str – a string of lower case characters

Program output:

The LSS of str (only one LSS in the case there more than one).

Example: For $str = "olympiad"$

$s = "lmp"$

Problem 2. [Numerical Expression] Given is an integer positive n , $1 < n < 10$ and n other decimal digits d_1, d_2, \dots, d_n , $1 \leq d_i < 10$.

Write a program to find all arithmetic expressions of the following form:

$$d_1 \oplus d_2 \oplus \dots \oplus d_n$$

having a value given integer v . The operation " \oplus " is an arithmetic operator, $\oplus \in \{+, -, *, /\}$, where "/" is integer division operator. All operators have the same priority and a left to right associativity.

Input data:

n – a positive integer, less than 10

$d_1 d_2 \dots d_n$ – decimal digits

v – the value of the expression

Program output:

The list of all expressions of the form from the above, whose values equals v .

Example: For $n = 6$, $v = 2$, and $d_1 = 3, d_2 = 7, d_3 = 4, d_4 = 9, d_5 = 8, d_6 = 4$

$$3 + 7 / 4 * 9 - 8 / 4 = 2$$

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