

Second Bulgarian National Olympiad in Informatics

May 31 and June 1, 1986

Second day

Given are n objects, $a_1, a_2, \dots, a_n$, ($3 \leq n \leq 20$). No any two of them have the same weight. We use the notation (i, j) to indicate that the object a_i is lighter than a_j ($i < j$, $1 \leq i \leq n$, $1 \leq j \leq n$). For example, at $n=6$, the pairs $\{(5,1), (5,3), (1,4), (4,6)\}$ mean that a_5 is lighter than a_1 and a_3 , a_1 is lighter than a_4 and a_4 is lighter than a_6 .

After weighing, several relations of the above type are recorded.

Problem 1.

Write a program, that inputs the number n of the objects and the recorded relations, calls subsequently subroutines for solving problems 2, 3 and 4, and outputs the obtained results.

Problem 2.

Find out how to order the objects, so that any object will precede all the objects heavier than it. For the above given data, an example of ordering is (5, 1, 2, 4, 3, 6).

Problem 3.

Find out how many new weighings have to be made, so that all the objects could be arranged in an increasing order. The number of the additional measurements should be minimal.

Problem 4.

Let all the necessary additional weighings have been made. Input their values and perform full ordering of the objects in an increasing order.

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