Задача A. Area

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	2 seconds
Ограничение по памяти:	64 mebibytes

Calculate the area of a polygon.

Формат входных данных

First line contains integer number n ($3 \leqslant n \leqslant 50000$) — number of vertices. n lines follow, containing two integer numbers x and y each ($-10000 \leqslant x, y \leqslant 10000$) — coordinates of vertices.

The vertices indeed form a polygon, i.e. the edges neither cross, nor touch each other.

Vertices are given in counterclockwise order.

Формат выходных данных

Output the area of the polygon with absolute error 10^{-3} or better.

Пример

standard input	standard output
3 0 0 1 0 0 1	0.5

Задача B. Bipartite Matching

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

A *bipartite graph* is a graph $(V, E), E \subset V \times V$ such that a set of vertices V can be partitioned into two sets A and B in such a way that $\forall (e_1, e_2) \in E\ e_1 \in A, e_2 \in B$ and $A, B \subset E, A \cap B = \varnothing$.

A *matching* of a bipartite graph is a set of its non-adjacent edges, that is, a set $S \subset E$ such that for any two edges $e_1 = (u_1, v_1), e_2 = (u_2, v_2)$ in S $u_1 \neq u_2$ and $v_1 \neq v_2$.

Your task is to find a maximal matching of a bipartite graph, that is the matching with the maximal number of edges.

Формат входных данных

First line contains two integer numbers n and m ($1 \leqslant n, m \leqslant 250$). n and m are numbers of vertices in A and B, respectively.

n lines follow with description of edges. i-th vertex of A is described in $i+1$-th line. Each line contains numbers of vertices of B connected with i-th vertex of A. The numbering of vertices in A and B is independent. Each list is terminated by a single zero.

Формат выходных данных

First line of the output file should contain one integer number l — the number of elements in a maximal matching. l lines should follow, each containing two integer numbers u_j, v_j — the edges forming a matching.

Пример

standard input	standard output
2 2 1 2 0 2 0	2 1 1 2 2

Задача C. Coincidence

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

Common subsequence of two strings s_1 and s_2 is a pair of sequences of indices $(\{a_i\}, \{b_i\})$ such that $a_1 < a_2 < \ldots < a_k$, $b_1 < b_2 < \ldots < b_k$, and $s_1[a_i] = s_2[b_i]$ for all $1 \leqslant i \leqslant k$.

Find a longest common subsequence of two strings.

Формат входных данных

First and second line of an input file contain two strings of French lowercase characters `a...z`. There are no spaces before, inside or after the strings. Lengths of strings do not exceed 100.

Формат выходных данных

In the first line of output file output k – the length of a longest common subsequence. On the second line output k numbers – indices of a common subsequence in the first input string. On the third line output the same for the second input string. Index of the first character in the string is 1. Indices should be output in ascending order.

Пример

standard input	standard output
abcd cxbydz	2 3 4 1 5

Задача D. Day of Week

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

We now use the Gregorian style of dating in Russia. The leap years are years with number divisible by 4 but not divisible by 100, or divisible by 400.

For example, years 2004, 2180 and 2400 are leap. Years 2001, 2181 and 2300 are not leap.

You task is to write a program which will compute the day of week corresponding to a given date in the nearest past or in the future using today's agreement about dating.

Формат входных данных

The input file consists of one or more test cases. Each test case is located in a single line. This line contains the day number d, month name M and year number y ($1980 \leqslant y \leqslant 10^{300}$). The month name is the corresponding English name starting from the capital letter. Some extra spaces and/or line feeds may follow the last case.

Формат выходных данных

For each test case, output a single line with the English name of the day of week corresponding to the date, statring from the capital letter. All other letters must be in lower case.

Пример

standard input	standard output
9 October 2001 14 October 2001	Tuesday Sunday

Задача E. Number Partitions

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

A *partition* of a number n is a set of integer positive numbers $d_1 \geqslant d_2 \geqslant \ldots \geqslant d_k$ such that

$$\sum_{i=1}^{k} d_i = n$$

Generate all partitions of a given number in anti-lexicographical order.

Формат входных данных

Input number contains one integer positive number n, $1 \leqslant n \leqslant 30$.

Формат выходных данных

Output file should contain all partitions of a number n, one partition at a line, in anti-lexicographical order.

Пример

standard input	standard output
3	3 2+1 1+1+1

Задача F. Fibonacci Strings

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

A *Fibonacci string* is a string of `0`s and `1`s that does not contain consecutive `1`s.

Output a Fibonacci string by its position in the lexicographically ordered set of all Fibonacci strings of the same length.

Формат входных данных

The input file contains two integers n and k; n is the length of the Fibonacci string ($1 \leqslant n \leqslant 44$), and k is the postion of the string to be displayed (valid $k \geqslant 1$).

Формат выходных данных

Output n-th Fibonacci string in the only line of output.

Пример

standard input	standard output
3 3	010

Задача G. (p, q)-Horse

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

(p, q)-horse is a generalisation of chess Knight who moves p steps one direction and q steps another (perpendicular) direction. Ordinary chess Knight is thus a $(2, 1)$-horse.

Your task is to determine how many moves (p, q)-horse needs to go from one cell on $M \times N$ chess-board to another.

Формат входных данных

One and only line in the input file contains 8 integer numbers M, N, p, q, x_1, y_1, x_2, y_2 ($1 \leqslant x_1, x_2 \leqslant M$, $1 \leqslant y_1, y_2 \leqslant N$, $0 \leqslant p \leqslant M \leqslant 100$, $0 \leqslant q \leqslant N \leqslant 100$).

Формат выходных данных

First line of the output file must contain an integer number k – number of moves that (p, q)-horse needs to move from cell (x_1, y_1) to the cell (x_2, y_2). $k+1$ lines must follow, containing sequential positions of (p, q)-horse on the way.

If (p, q)-horse cannot reach (x_2, y_2) from (x_1, y_1), output `-1`.

Пример

standard input	standard output
3 3 1 1 1 1 3 3	2 1 1 2 2 3 3
2 2 1 1 1 1 1 2	-1

Задача H. Reversive Inversions

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

Inversion table for a permutation P of numbers $\{1, 2, \ldots, N\}$ is the table $A = (A_i)_{1 \leqslant i \leqslant N}$ which maps each $i = P_j$ into the number of indices j' such that $j' \leqslant j$ but $P_{j'} > P_j = i$.

Given an inversion table for a permutation P, calculate the inversion table for the inverse permutation P^{-1}.

Формат входных данных

File consists only of N integer numbers, delimited by spaces and newline characters, that form the inversion table of a permutation. You may assume that $1 \leqslant N \leqslant 5000$.

Формат выходных данных

Output N integer numbers separated by single spaces — inversion table for the inverse permutation. Leave no trailing spaces at the end of the single line of output.

If there are several possible answers, output any of them. If there are no answers, output the first N primes instead.

Пример

standard input	standard output
5 0 1 3 2 1 0	1 5 1 3 2 0 0

Задача I. Joseph Problem

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

n boys are standing in circle. They start counting themselves clockwise, starting from 1. As soon as the count reaches p, the last boy counted leaves the circle, and they continue counting from the next boy, starting from 1 again.

Last remaining boy wins.

Can you calculate his number in clockwise order, if the boy from whom the counting originally started has number 1?

Формат входных данных

Input file contains two integer numbers, n and p. ($1 \leqslant n, p \leqslant 10^6$).

Формат выходных данных

Output file should contain one number — the original number of the last boy.

Пример

standard input	standard output
3 4	2

Задача J. Combinations-2

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

A *combination* of k elements out of n is an increasing sequence of k integer numbers in range from 1 to n.

Generate all combinations of k elements out of n in any order such that any two adjacent combinations have no more than one difference (that is, if S_1 and S_2 are two adjacent combinations, then $\#(S_1 - S_2) \leqslant 1$).

Формат входных данных

Input file contains two integer numbers n and k such that $1 \leqslant k \leqslant n \leqslant 15$.

Формат выходных данных

Output $\binom{n}{k}$ lines – all combinations of k elements out of n in any order satisfying the conditions above.

Пример

standard input	standard output
3 2	1 2 1 3 2 3

Задача K. Average Length

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

You are given a description of a working road network. Your task is to find average length of the shortest path between two towns in this network.

The average length is a sum (for all the pairs (a, b) where the shortest path exists from a to b and has length l_i) of all the l_i, divided by a number of such pairs. a and b in this definition are different integer numbers less or equal to n — the total number of towns.

Формат входных данных

The first two numbers in the input are n and k ($1 \leqslant n \leqslant 100$, $1 \leqslant k \leqslant n(n-1)$). The next k lines contain three integers each (a_i b_i L_i, $1 \leqslant a_i, b_i \leqslant n$, $1 \leqslant L_i \leqslant 1000$) representing a one-way road from a_i to b_i of length L_i.

Формат выходных данных

You are to display only one number rounded to 6 digits after decimal point — average length of the shortest path.

Пример

standard input	standard output
6 4 1 2 7 3 4 8 4 5 1 4 3 100	25.000000

Задача L. Nearest Approximation

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

You are given N integer numbers. Your task is to insert only one plus or minus sign between any two adjacent of them so as to make the value of the resulting expression as close as possible to a given integer number A.

Формат входных данных

First line of the input file contains two integer numbers: N ($1 \leqslant N \leqslant 10000$) and A which cannot be greater than 10000 by an absolute value. N lines follow, each containing only one integer number X_i which does not exceed 10000 by an absolute value. Also it is guaranteed that the total sum of absolute values of all N numbers does not exceed 10000.

Формат выходных данных

In the first line you are to output the value of the resulting function (which has to be as close as possible to A). In the second line the optimal expression giving such a value must be displayed in the form $X_1[+|-]X_2[+|-]\ldots X_{N-1}[+|-]X_N$.

Пример

standard input	standard output
3 0 3 -2 1	0 3+-2-1

Задача M. Least Common Multiple

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

Calculate the least common multiple of all integers between 1 and n.

Формат входных данных

One integer $1 \leqslant n \leqslant 1000$.

Формат выходных данных

One integer.

Пример

standard input	standard output
3	6

Задача N. Permutations

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

Generate all permutations of numbers $1, \ldots, n$ in such an order that any two adjacent permutations differ only by the order of two adjacent elements (that is, $1, 2, 3, 4$ can be followed by $1, 2, 4, 3$, but not by $1, 4, 3, 2$).

Формат входных данных

Input file contains an integer number $1 \leqslant n \leqslant 8$.

Формат выходных данных

Output file should contain $n!$ lines, n numbers each (separated by spaces).

Пример

standard input	standard output
3	1 2 3 1 3 2 3 1 2 3 2 1 2 3 1 2 1 3

Задача O. Segments

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

You are to find the total length of union of n segments located on a horizontal line.

Формат входных данных

The first number in the input file is an integer n ($1 \leqslant n \leqslant 5000$) representing the number of segments. The rest of file is filled by $2n$ integers (x_1 y_1 x_2 y_2 ...) meaning coordinates of two points confining i segment. All coordinates do not exceed 10^9 by an absolute value.

Формат выходных данных

Print only one number — the total length of union of given segments.

Пример

standard input	standard output
3 0 5 3 6 7 8	7

Задача P. Two Circles

Имя входного файла:	*standard input*
Имя выходного файла:	*standard output*
Ограничение по времени:	1 second
Ограничение по памяти:	64 mebibytes

There are two circles lying on the plane. Your task is to find all points of their intersection.

Формат входных данных

The first line of the input file contains number of test cases K ($1 \leqslant K \leqslant 10000$). Each test case consists of two lines: first contains the description of the first circle, and the second one does for the second. The description of each circle is written in the form x, y, r ($-1000 \leqslant x, y \leqslant 1000$, $0 < r \leqslant 1000$). All numbers are integer.

Формат выходных данных

For each test case you are to output one of the following messages:

- "`There are no points`" — if there are no intersection points.
- "`There are only` i `of them`" — if the circles have exactly i intersection points. In this case next i lines contain coordinates of the points x'_j and y'_j. Points are to be displayed in the lexicographical order (first with the smallest x, if x coordinates are equal, first with the smallest y). Numbers are to be displayed with 6 digits after the decimal point.
- "`Too many points`" — if there are infinitely many points of intersection.

All messages have to be displayed without quotes.
Separate output for different cases with a single blank line.

Пример

standard input	standard output
2 0 0 2 4 0 2 0 0 1 1000 1000 1	There are only 1 of them 2.000000 0.000000 There are no points