Problem A. Coins

Input file:	standard input
Output file:	standard output
Time limit:	4 seconds
Memory limit:	256 mebibytes

Alice and Bob are playing game with coins. There are two piles of coins on the table. Players take turns alternatively by following rules: on every turn player could take nonzero number of coins from some pile or take the same nonzero number of coins from both piles. The player who couldn't make move loses.

Input

In the only line of input there are two integers C_1, C_2 $(1 \le C_i \le 7^{7^7})$ — number of coins in piles.

Output

Output "First" if the first player wins or "Second" if he loses.

standard input	standard output
1 1	First
1 2	Second
1 3	First

Problem B. Equation

Input file:	standard input
Output file:	standard output
Time limit:	3 seconds
Memory limit:	256 mebibytes

Given an equation of the form $X^N + Y^N \equiv Z^N \mod M$.

You are to find a number of different solutions to this equation for fixed N and M. The solution is such three integers (X, Y, Z) that:

- $1 \le X \le Y < M$
- $1 \le Z < M$
- $X^N + Y^N \equiv Z^N \mod M$

Input

In the first line of input file there are integers N and M $(1 \le N \le 7^7, 1 \le M \le 7^7)$.

Output

Output one integer — answer to the problem.

standard input	standard output
1 3	2
2 4	5
3 5	8

Problem C. Polynom

Input file:	standard input
Output file:	standard output
Time limit:	4 second
Memory limit:	256 mebibytes

Given a polynom $P(x) = a_0 + a_1 x + a_2 x^2 + \ldots + a_{N-1} x^{N-1}$.

You are to find the values of $P(x) \mod M$ for $x = 0, 1, \dots, K$.

Input

In the first line of input file there are integers N, K, M. $(1 \le N \le 2000, 1 \le K \le 200000, 1 \le M \le 10^9)$. In the second line integer coefficients $a_0, a_1, \ldots, a_{N-1}$ are written $(0 \le a_i \le 10^9)$.

Output

In the first line of the output print values $P(0) \mod M, P(1) \mod M, \ldots, P(K) \mod M$.

standard input	standard output
2 4 239	17 20 23 26 29
17 3	
3 5 11	533594
581	

Problem D. Reverse the bits

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 mebibytes

Let $n = 2^s$, where $s \ge 0$ is integer. Consider $b_{s-1}b_{s-2} \dots b_0$ binary representation of integer $i \ (0 \le i < n)$ with leading zeros. Let $c_j = b_{s-1-j}$, so $c_{s-1}c_{s-2} \dots c_0$ is reversed binary representation of i. Let define a_i such number that $c_{s-1}c_{s-2} \dots c_0$ is its binary representation.

For example s = 3, i = 3. Binary representation of $i - 011_2$, reversed binary representation of $i - 110_2$ and $a_3 = 6$ for s = 3.

You should answer the queries for calculating sum $(a_l + a_{l+1} + \cdots + a_r) \mod (10^9 + 7)$

Input

In the first line of input are written integer s ($0 \le s \le 31$). In the second line are written integer k — number of queries ($1 \le k \le 5 \cdot 10^5$). The next k lines contain descriptions of queries, each consists of two integers l, r ($0 \le l \le r < 2^s$).

Output

Output k lines with answers for queries.

standard input	standard output
3	6
1	
3 3	
2	6
2	2
0 3	
0 1	
25	742367723
1	
17 239	

Problem E. Triangle

Input file:	standard input
Output file:	standard output
Time limit:	1.5 seconds
Memory limit:	256 mebibytes

N points are located on the plane. Three different points are chosen randomly; all sets of three points have equal probability of being chosen. These points are then connected by line segments, and the perimeter of the resulting triangle is calculated. Note that the triangle may be degenerate.

Given the coordinates of points, find the expectation of the perimeter of the resulting triangle. The *expectation* of the perimeter is the sum $\sum_{\Delta} p_{\Delta} \cdot f_{\Delta}$ where p_{Δ} is the probability that the triangle Δ is

chosen and f_{\bigtriangleup} is its perimeter.

Input

The first line of input contains two integers H and W $(1 \le H, W \le 700)$. Next H lines contain W symbols each; *j*-th symbol of *i*-th line is '1' if there is a point with coordinates (i, j), and '0' otherwise. There are at least three points present.

Output

The first line of output should contain one real number — the expectation of triangle perimeter. Your answer should be accurate to at least six digits after the decimal point.

standard input	standard output
11 20	34.142135624
100000000100000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
000000000000000000000000000000000000000	
100000000000000000000000000000000000000	
3 3	5.794112550
101	
010	
101	

Problem F. Comparing Strings

Input file:	standard input
Output file:	standard output
Time limit:	1.5 seconds
Memory limit:	256 MiB

You are given two strings S_1 and S_2 consists of uppercase english letters. For each string is chosen starting point k_j . After that all symbols of string starting from k_j are printed. After printing of the last element of the string the process continues from the first character of the string. Now we have two infinite sequences of symbols T_1 and T_2 .

For all pairs k_1, k_2 we can calculate the value $\lim_{n \to \infty} \frac{\sum_{i=1}^{n} eq(T_1[i], T_2[i])}{n}$ where $T_j[i] - i$ -th symbol of string T_j and eq(a, b) is 1 for equal characters and 0 for different. You are to find all possible values for this expression (average number of coincident symbols in shifted strings).

Input

In the first line of input file there is a non-empty string S_1 . In the second line of input file there is a non-empty string S_2 . The length of each string does not exceed 10^5 .

Output

Print all possible distinct values for average number of coincident symbols in the form of irreducible fractions in ascending order. Separate the numerator and denominator by '/' character.

standard input	standard output
CAB	1/6
BCACAC	1/3
	1/2
ABRACADABRA	0/1
TEST	
AAAB	1/4
BABA	3/4