Problem A. Life Game

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	512 mebibytes

Rich people are playing life game, generally it is like they find some poor people. And they brainwash those people, make them believe that they have to kill all other to live. And they watch the procedure and bet on the results for fun. Of course they will kill the winner when the winner believe that he wins.

Todays game is different from before.There is a $n \times m$ matrix of people. Now you are the organizer and you can control those peoples life. If people at row i, column j, survive at the end, you will be rewarded with $w_{i,j}$ money. Otherwise you are rewarded with $b_{i,j}$ money.

Also,those rich people have some strange request, each one will point out a contiguous submatrix of this matrix and say: if people in this sub matrix all die (or survive), you are rewarded with s money.

You don't really care about those people's life, so you want to maximize the money you get. What is the maximum money you can get if you kill those people optimally?

Please note that there's no restriction on killing people, you can kill noone, you can also kill everyone.

Input

The first line contains three integers n, m, r ($n \le 50$, $m \le 50$, $r \le 5 \cdot 10^4$),denote the number of rows, the number of columns and the number of requests.

Then follows n lines containing m integers each — a $n \times m$ integer matrix b. Then in same format follows a $n \times m$ integer matrix w. ($0 \le b_{i,j}, w_{i,j} \le 100$).

Then r lines follows, each represent a request. Each line contains 6 integers r_1, c_1, r_2, c_2, t, s. It means the sub-matrix's top left corner is (r_1, c_1),and the bottom right corner is (r_2, c_2). $t = 0$ if they should survive, $t = 1$ if they should die.

s is the reward you can get if this request are fulfilled ($0 \le s \le 10^4$).

Output

Print the answer in one line.

Example

standard input	standard output
2 2 3 34 44 63 30 1 9 53 57 1 2 2 2 1 2843 1 1 2 1 0 2169 2 1 2 1 1 6980	9994
2 2 3 50 93 65 70 52 28 91 25 1 1 2 1 0 9862 2 1 2 1 1 1876 2 2 2 2 0 4190	14313

Problem B. String Queries

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Given a string s consisting of lowercase English letters only, denote $f(s)$ as the number of distinct substring of s.

You need to answer next queries: calculate $f(s[l..r])$, where $s[l..r]$ means the substring of s, with beginning at l and end at r, inclusive.

Input

The first line contains a string s ($1 \le |s| \le 5000$), consisting of lowercase English letters. The second line contains an integer Q ($1 \le Q \le 10^4$), — the number of queries. Then Q lines follow, each of them containing two integers l ans r ($1 \le l \le r \le |s|$), denoting a query.

Output

For each query, print the answer in one line.

Example

standard input	standard output
2 bbaba 5 3 4 2 2 2 5 2 4 1 4	3 1 7 5 8
baaba 5 3 3 3 4 1 4 3 5 5 5	1 3 8 5 1

Problem C. Coprimes

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

Count the number of permutation of number $1..n$ that every adjacent number are coprime.To avoid large number,output the result modulo M.

Input

Input contains two integers n and M ($1 \le n \le 28$, $1 \le M \le 30000$).

Output

Print the answer in a line.

Example

standard input	standard output
5 10000	72

Problem D. Colored Balls

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

Given a row of n balls numbered from 1 to n, each ball is white initially. At each step I randomly chose a interval $[l, r]$ and paint all balls in this interval to black.Each of C_{n+1}^2 intervals have a equal chance of being chosen.

Process stops when all balls are black.

What is the expected steps before process stops?

Input

The first line contains integer T ($1 \le T \le 50$), denoting the number of the test cases. Then T lines follow, each line contains an integer n ($1 \le n \le 50$).

Output

For each test cases,print the answer in a line. The answer will be considered correct if its absolute error doesnt exceed 10^{-4}.

Example

standard input	standard output
3 1 2 3	1 2.0 2.9

Problem E. Another Tree Problem

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	512 mebibytes

Here we have a tree which has n vertices. We define $dist(u, v)$ as the number of edges on the path from u to v. And for each vertices u , define $E_u = \sum_{v=1}^{n} dist(u, v)^k$

Given the tree and k, print E_i for every vertice from 1 to n modulo 10007.

Input

The first line contains two integers n, k ($1 \le n \le 5 \cdot 10^4$, $1 \le k \le 500$). Each of the next $n - 1$ lines contains two integers a and b ($1 \le a, b \le n$),denoting there is an edge between a and b.

Output

Print n lines, the i-th of them must contain E_i.

Example

standard input	standard output
5 3 1 2 2 3 3 4 4 5	100 37 18 37 100

Problem F. String and Queries-2

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

There is a string s consisting only of first 20 lowercase English letters.

And we have several queries: each time I have k letters $c_1, c_2, \ldots, c_k$, and I wonder how many consecutive substring of string s that each c_i has occur even times in it. Note that 0 is even number too.

Two substring with the same content but different position are considered different.

Input

The first line contains a string s ($1 \le |s| \le 10^5$), the second line contains a number Q ($1 \le Q \le 3 \cdot 10^4$), denoting the number of queries. Then Q lines follow, each line start with a number k ($1 \le k \le 5$), then contains k lowercase English letters $c_1, c_2, \ldots, c_k$ (There won't be duplicated c_i).

Output

Print the answer in one line.

Example

standard input	standard output
cacca 5 3 c a b 2 c b 2 a b 3 c b a 2 a b	2 7 6 2 6

Problem G. LCM

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Given an integer n, find a pair of positive integers a and b so that $a + b = n$ and $[a, b]$ is as large as possible. $[a, b]$ denote the least common multiplier of a and b.

Input

The first line contains integer $T(1 \le T \le 10^4)$, denoting the number of the test cases. Each test case is placed on its own line and contains one integer n $(2 \le n \le 10^9)$.

Output

For each test case, print the answer in a line.

Example

standard input	standard output
3 2 3 4	1 2 3

Problem H. Erase the String

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

Given a string s. We can erase a subsequence of it in one step, if this subsequence is palindrome. For example, we can erase "`abcba`" from "`axbyczbea`" and get "`xyze`" in one step.

We should erase whole string, taking as few steps as possible. How many steps do we need?

Input

Input contains the string s, consisting of lowercase English letters ($1 \le |s| \le 16$).

Output

Print the answer in a line.

Example

standard input	standard output
aa	1
abb	2

Problem I. Thickness

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Given n triangles (possibly degenerated) on a plane.

For every point p, if there are exactly k triangles containing it, we will say that *thickness* of this point is k.

For every i from 1 to n calculate the area of all points whose thickness is i.

Input

The first line contains integer n ($1 \le n \le 50$), denoting the number of the triangles. Then n lines follow, each containing six integers x_1, y_1, x_2, y_2, x_3, y_3, denote there's a triangle with vertices (x_1, y_1), (x_2, y_2), (x_3, y_3), $0 \le x_i, y_i \le 100$ for every i.

Output

Print n lines, the i-th is the total area for thickness i. The answer will be considered correct if its absolute error doesnt exceed 10^{-4}.

Example

standard input	standard output
5 29 84 74 64 53 66 41 49 60 2 23 38 47 21 3 58 89 29 70 81 7 16 59 14 64 62 63 2 30 67	1348.5621251916 706.2758371223 540.0414504206 9.9404623255 0.0000000000

Problem J. GCD

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

Given a sequence of number $a_1, a_2, \ldots, a_n$. They are also a permutation of $1..n$. You need to answer some queries,each with the following format: if we chose two numbers $a \neq b$ from interval $[l, r]$, what is the maximum $gcd(a, b)$?

Input

The first line contains an integer n ($1 \leq n \leq 5 \cdot 10^4$).

The second line contains n integers a_1, a_2, ..., a_n.

The third line contains an integer Q ($1 \leq n \leq 5 \cdot 10^4$) denoting the number of queries. Then Q lines follows, each lines contains two integer l, r ($1 \leq l \leq r \leq n$), denoting a query.

Output

For each query print the answer in one line.

Example

standrd input	standard output
10 8 2 4 9 5 7 10 6 1 3 5 2 10 2 4 6 9 1 4 7 10	5 2 2 4 3

Problem K. Points on a Plane

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	512 mebibytes

We have a plane that has no points at the start.

And at the time i we add point p_i (x_i, y_i). There is n points in total.

Every time after we add a point, we should output the square of the distance between the closest pair on the plane if there's more than one point on the plane.

Note that te data of this problem is randomly generated.

To generate a sequence $x_1, x_2, \ldots, x_n$,we let $x_0 = 0$, and give you 3 parameters: A, B, C. Then $x_i = (x_{i-1} \cdot A + B) mod C$. The parameters are chosen randomly.

To avoid large output, you simply need output the sum of all answers in one line.

Input

The input contains 7 integers: n, A_x, B_x, C_x, A_y, B_y, C_y. A_x, B_x, C_x are the given parameters for $x_1, \ldots, x_n$. A_y, B_y, C_y are the given parameters for $y_1, \ldots, y_n$.

$n \leq 5 \cdot 10^5$, $10^4 \leq A, B, C \leq 10^6$.

Output

Print the answer in a line.

Example

standard input	standard output
5 765934 377744 216263 391530 669701 475509	8237503125
5 349753 887257 417257 158120 699712 268352	49959926940