# Problem A. Airplane Ticket

| | |
|---|---|
| Input file: | standard input |
| Output file: | standard output |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

The booking number of an airplane ticket is a string of six characters; each character is either a digit from 0 to 9 or an uppercase Latin letter.

You are interested in the question of whether it is possible to replace all the letters in the booking number with digits in such a way that the same digits correspond to the same letters, different digits correspond to different letters, none of the chosen digits are present in the number initially (for example, in a booking with the number ICPC25, it is not possible to replace any letter with the digits 2 or 5, as they are already present in the number), and at the same time, the resulting six-digit number (possibly with leading zeros) is divisible by 2.

Write a program that answers this question based on the given booking code.

## Input

The first line of input contains the booking code — a word consisting of six characters: digits and uppercase letters of the Latin alphabet.

## Output

Output 1 if there exists a replacement of letters with digits such that the resulting number is even, and 0 otherwise.

## Examples

| standard input | standard output |
|---|---|
| ICPC25 | 0 |
| 25TASK | 1 |

# Problem B. String Queries

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

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

## Output

For each query, print the answer in one line.

## Example

| standard input | standard output |
|---|---|
| bbaba<br>5<br>3 4<br>2 2<br>2 5<br>2 4<br>1 4 | 3<br>1<br>7<br>5<br>8 |
| baaba<br>5<br>3 3<br>3 4<br>1 4<br>3 5<br>5 5 | 1<br>3<br>8<br>5<br>1 |

# Problem C. Coprimes

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 4 seconds |
| Memory limit: | 1024 megabytes |

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 $M$ ($1 \leq n \leq 28$, $1 \leq M \leq 30000$).
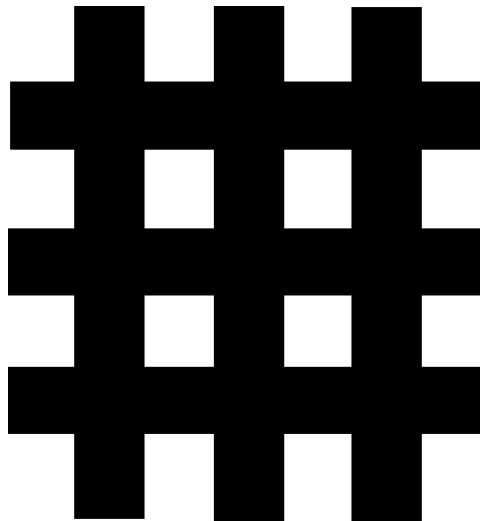
## Output

Print the answer in a line.

## Example

| standard input | standard output |
|---|---|
| 5 10000 | 72 |

# Problem D. Belgian Waffles

| | |
|---|---|
| Input file: | standard input |
| Output file: | standard output |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

A waffle with holes, otherwise known as a "Belgian waffle", has a grid pattern. A waffle with $n$ vertical lines and $n$ horizontal lines is called a waffle of size $n$. The thickness of each line is 1 cm, and the lines in one direction are spaced 1 cm apart. All areas except for the lines and their intersections are holes, and the four corners of the waffle are also holes. For example, a level 3 waffle with holes can be represented as shown in the figure below, where the waffle lines are shown in black and the holes in white.

Write a program to draw a level $N$ waffle with holes for a given $N$.

## Input

The input contains a single integer: the required size of the waffle $n$ ($1 \leq n \leq 100$).

## Output

Represent each area of size 1 cm × 1 cm as a single character: use '#' for the waffle lines and '.' for the holes. Output the waffle of size $n$ using these characters.

# Examples

| standard input | standard output |
| --- | --- |
| 1 | `.#.`<br>`###`<br>`.#.` |
| 2 | `.#.#.`<br>`#####`<br>`.#.#.`<br>`#####`<br>`.#.#.` |
| 3 | `.#.#.#.`<br>`#######`<br>`.#.#.#.`<br>`#######`<br>`.#.#.#.`<br>`#######`<br>`.#.#.#.` |

# Problem E. Cool Numbers

| | |
|---|---|
| Input file: | standard input |
| Output file: | standard output |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

An integer $x$ is called *cool* if it can be represented as the sum of several consecutive powers of two. More formally, $x$ is outstanding if there exist integers $l \leq r$ such that $x = \sum_{i=l}^{r} 2^i$.

For a given $n$, determine how many numbers between 1 and $n$ inclusive are cool.

## Input

The first line of the input contains a single integer $n$ $(1 \leq n \leq 10^{18})$.

## Output

Output a single integer — the number of the cool numbers between 1 and $n$ inclusive.

## Example

| standard input | standard output |
|---|---|
| 42 | 16 |

# Problem F. String and Queries-2

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

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

For each query, print the answer in one line.

## Example

| standard input | standard output |
|---|---|
| cacca<br>5<br>3 c a b<br>2 c b<br>2 a b<br>3 c b a<br>2 a b | 2<br>7<br>6<br>2<br>6 |

# Problem G. LCM

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

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

## Output

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

## Example

| standard input | standard output |
|---|---|
| 3 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | |

# Problem G. Erase the String

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 1 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. Dragon Race

| | |
|---|---|
| Input file: | standard input |
| Output file: | standard output |
| Time limit: | 2 second |
| Memory limit: | 1024 megabytes |

In the Dragon Race game, you control a dragon that is running through a linear world with obstacles (trees). You win the game if you reach the end of the world without hitting any tree.

The world consists of $n$ cells, which can either be empty or contain a tree. You start at the leftmost cell (which is always empty) and the goal is to get past the rightmost cell. At each cell, the dragon can either move one position to the right, or jump over some fixed number of cells. For the first jump, you skip one cell, but with each subsequent jump, you skip one additional cell compared to the previous jump. That is, the $k$th jump skips exactly $k$ cells.

You quickly master this simple game, so you pose a more interesting challenge: count how many ways there are to win the game.

## Input

The first line of the input contains one integer $n$ ($1 \leq n \leq 10^5$), the length of the world. The second line contains $n$ characters, each character being either '#' or '.', indicating a mountains or an empty cell, respectively.

## Output

Output the number of ways to win the game, modulo $998\,244\,353$.

## Examples

| standard input | standard output |
|---|---|
| 5<br>..... | 12 |
| 5<br>.#... | 4 |
| 8<br>.##.#.#. | 0 |

# Problem J. GCD

| | |
|---|---|
| Input file: | *standrd input* |
| Output file: | *standard output* |
| Time limit: | 1 second |
| Memory limit: | 1024 megabytes |

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 $a_1, a_2, \ldots, a_n$ $(1 \leq a_i \leq 5 \cdot 10^4)$.

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 $l, r$ $(1 \leq l < r \leq n)$, denoting a query.

## Output

For each query print the answer in one line.

## Example

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

# Problem K. Points on a Plane

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 3 seconds |
| Memory limit: | 1024 megabytes |

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 $y_1, \ldots, y_n$.

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

## 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 |