Problem A. Binary password

Input file:	`binary.in`
Output file:	`binary.out`
Time limit:	1 second
Memory limit:	64 megabytes

Zhomart uses binary string as a password for his computer. Now he forgot his old password and wants to get a new one, which is a binary string of length n. He believes that password is strong enough if it doesn't contain two consecutive zeroes. To get a new password he generates a random binary string of length n. If it is not strong he generates a random string again and so on until he finds a strong password. Find the expected number of random passwords Zhomart must generate before he finds strong one.

Input

The only line of input contains one integer n ($1 \le n \le 60$).

Output

Print the expected number as p/q, where p and q are relatively prime positive integers.

Examples

`binary.in`	`binary.out`
`1`	`1/1`
`4`	`2/1`

Problem B. Combination

Input file:	`combination.in`
Output file:	`combination.out`
Time limit:	2 seconds
Memory limit:	128 megabytes

How many numbers are divisible by the prime number p in the first n rows of Pascal Triangle? In other words, find the number of pairs (j, i) $(0 \le j \le i < n)$ so that $C(i, j)$ is divisible by p.

Here

$$C(i, j) = \frac{i!}{j!(i-j)!}$$

Input

The first line of input contains two integer numbers n, p $(1 \le n \le 10^7, 3 \le p \le 100)$

Output

Print the answer.

Examples

combination.in	combination.out
100 7	2689

Problem C. Easy

Input file:	`easy.in`
Output file:	`easy.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

Given a string s, determine if it can be a palindrome after deleting exactly one character.

Input

Input file contain string S. ($1 \leq length(S) \leq 10000$)

Output

Print `yes`, if after deleting exactly one character from string s, it turns to palindrome, otherwise print `no`. If answer is `yes`, in the second line of output print the resulting palindrome string. If there are several solutions print any of them.

Examples

easy.in	easy.out
abccxba	yes abccba
dsfsfasf	no

Problem D. Factorial

Input file:	`factorial.in`
Output file:	`factorial.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

Input

Single line of input contains an integer number n ($1 \leq n \leq 10^{18}$)

Output

Print $n! \pmod{3469708049238200000}$

Examples

factorial.in	factorial.out
6	720

Note

$n! = 1 \cdot 2 \cdot 3 \cdots n$.

$a \pmod{b}$ = remainder of a after division by b.

Problem E. Freelancers game

Input file:	`freelance.in`
Output file:	`freelance.out`
Time limit:	1 second
Memory limit:	64 megabytes

Serik and Zhomart are freelancers. They got orders from n different companies. i-th company gave them a_i tasks and agreed to pay b_i dollars when they finish all of the tasks they give. Serik and Zhomart have only one laptop, so each day only one of them works and completes only one task which is selected by his own choice. Furthermore, they agreed that each day they alternate (Serik starts first) in performing tasks and who completes the last task of a company will get all the money given by that company. Each of them wants to earn much. Thus, they select tasks optimally. Find the money earned by each of them.

Input

First line of input contains one integer n ($1 \le n \le 100$) – number of companies. Each of the next n lines contains two integers a_i ($1 \le a_i \le 20$) and b_i ($1 \le b_i \le 10000$) – the number of tasks and money given by i-th company.

Output

Output two integers – the money earned by Serik and Zhomart respectively.

Examples

freelance.in	freelance.out

4
1 5
2 6
3 4
1 8
	18 5

Note

1st day Serik completes the only task given by fourth company and earns 8 dollars

2nd day Zhomart completes the only task given by first company and earns 5 dollars

3rd day Serik completes one of the three tasks given by third company and there remains two tasks of this company

There remained two tasks of each company. No matter how Zhomart will act, Serik earns all the remaining money.

So, total earnings of Serik 8+4+6=18 and total earnings of Zhomart 5.

Problem F. Graph decompositions

Input file:	`decomp.in`
Output file:	`decomp.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

One day Zhomart was solving a path routing problem related to networks. He discovered that his underlying graph is *directed* and *acyclic*. When Serik came to see this problem he was wonder that there are many ways to *decompose* Zhomart's graph into edge-disjoint paths. Friends now started to think in how many ways this can be done. Please help them.

Input

First line of the input file contains two integers n and m ($1 \le n \le 1000$, $1 \le m \le 499500$).

Each of the next m lines contains two integers i, j meaning that there is a directed edge from vertex i to vertex j in the given graph.

Output

Output one integer number – the answer to the problem by modulo $10^9 + 7$.

Examples

decomp.in	decomp.out

3 3
1 2
2 3
1 3
	2

Note

There are 2 possible decompositions from sample:

1) two paths: $1 \to 2 \to 3$ and $1 \to 3$

2) three paths: $1 \to 2$, $2 \to 3$ and $1 \to 3$

Problem G. Graph Game

Input file:	`graph.in`
Output file:	`graph.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

Given graph, with $2n$ vertices and m edges. On every vertex and edge written an integer number.

Serik and Zhomart were bored and invented the game on graph. The rules of this game are the following:

- Serik starts the game and they alternate turns.
- There are exactly n turns for each player .
- In every turn Player must choose a non-chosen vertex.
- The score of the player is the sum of numbers written in his chosen vertices, plus the sum of numbers written in edge, where both vertices of the edge are chosen by him.
- Every player tries to maximize the difference between his and opponent's score.
- Of course, Serik and Zhomart are very smart.

Input

The first line contains integers n, m $(1 \le n, m \le 10^5)$.

The second line contains integers $a_1, a_2, \ldots, a_{2n}$ $(1 \le a_i \le 1000)$ – numbers on vertices.

Next m lines contain three integer numbers, u, v, w, $(1 \le u, v \le n, 1 \le w \le 1000)$ – vertices u and v are connected, w is number on this edge. Only restriction for graph is: no loop edge.

Output

Print the difference between Serik's score and Zhomart's score.

Examples

graph.in	graph.out

3 3
2 3 2 2 3 1
6 1 3
4 3 2
1 2 1
	1

Problem H. Palindrome

Input file:	`pal.in`
Output file:	`pal.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

Given string. In one operation you can swap any two letters. Find minimum number of operations needed in order to receive palindrome or -1, if it is impossible.

Input

First line of input contains one string s ($1 \leq |S| \leq 1000$). Given string is not empty and only contains small latin letters.

Output

Answer to the problem.

Examples

pal.in	pal.out
abab	1
abc	-1

Problem I. Contest preparation

Input file:	`contests.in`
Output file:	`contests.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

One time Arti was asked to prepare several programming contests. As he is very lazy, he decided to cheat a little. He prepared N tasks and for i-th task he prepared s_i statements. Now he wants to gather contests from these tasks with following rules:

- each task can be used in a contest only once;
- a contest must consist of A to B tasks;
- two contests are different if there is at least one task that is in one contest and not in the second one or if there is at least one task that has different statements in these contests;
- only set of tasks matters, not the order.

Calculate, how many different contest Arti can prepare. As this number can be very large, output it modulo $10^9 + 7$.

Input

First line contains N, A, B ($1 \le A \le B \le N \le 10000$). Second line contains N integer numbers: s_i ($1 \le s_i \le 100$).

Output

Print one line — the number of different contests Arti can prepare modulo $10^9 + 7$.

Examples

contests.in	contests.out
2 1 2 3 4	19

Problem J. String Cutting

Input file:	`strcutting.in`
Output file:	`strcutting.out`
Time limit:	2 seconds
Memory limit:	64 megabytes

You are given string S. It is allowed to take any two same neighbor symbols of this string and delete them. This operation you can do while possible. At the beginning you can choose any symbols from string and delete them. Determine the minimum number of symbols you can delete at the beginning, so that you get the empty string after performing allowed operations.

Input

Input file contains string S. ($1 \leq length(S) \leq 100$)

Output

Print out the minimum number of symbols you should delete at the beginning.

Examples

strcutting.in	strcutting.out
abbcddka	2

Problem K. Zero quintuples

Input file:	`zero.in`
Output file:	`zero.out`
Time limit:	1 second
Memory limit:	64 megabytes

You are given a sequence of n distinct integers $a_1, a_2, \ldots, a_n$. *Zero quintuple* is any five numbers a_i, a_j, a_k, a_p, a_q $(i < j < k < p < q)$ which sum to zero $(a_i + a_j + a_k + a_p + a_q = 0)$. Find the number of distinct zero quintuples from the given sequence.

Input

The first line of input contains n $(5 \le n \le 2000)$ — number of elements in a sequence. The next line contains n distinct integers $a_1, a_2, \ldots, a_n$ $(-10000 \le a_i \le 10000)$ — elements of the sequence.

Output

The only line of output contains one integer – the number of zero quintuples in a given sequence.

Examples

zero.in	zero.out
7 -4 2 3 -1 5 0 -2	2

Note

Two zero quintuples in a given sequence are:

-4 2 3 -1 0

-4 2 -1 5 -2