Quinta Competencia

A. Zoo

1.0 s, 256 MB

The mayor built a new Zoo. The Zoo looks like a **cycle** made up of n animal viewing locations, the locations are numbered from 1 to n where locations i and $i+1$ are adjacent and locations 1 and n are also adjacent. Before entering the Zoo, citizens pick two locations a, b such that $(a \neq b)$, and one of the two simple paths connecting them(clockwise or counter clockwise) such that the distance between a and b is at most k along that path.

The citizens then starts walking between the locations following 4 conditions:

1) The citizens shouldn't move outside the path between a and b.

2) All locations between a and b along the chosen path should be visited.

3) The walk should end on the starting location a.

4) The length of the walk is at most m.

How many possible walks can the citizens make? print that number module 10^9+7.

Input

The input is made up of one line containing 3 integers n, k, m, $(1 \leq k < n \leq 10^5, 1 \leq m \leq 2000)$.

Output

Print one integer x the answer to the problem module 10^9+7.

input
4 3 3
output
8

input
10 5 6
output
160

input
4 2
output
1

input
1 10
output
0

input
5 5
output
1

B. Picky Eater

1.0 s, 256 MB

Once upon a time, Hamza was hungry, only leftover food could be found in the fridge, so he wanted to order online.

Hamza currently has x JDs, and the sandwich he wants to buy costs y JDs, can Hamza order food online or he has to face his biggest enemies, leftover food?

Input

The first and only line in the input contains exactly 2 space separated integers $x, y(1 \leq x, y \leq 10)$, the amount of money he has, and the cost of the sandwich.

Output

If Hamza can buy the sandwich print "1"(on a single line without quotes), otherwise print "0"(on a single line without quotes).

C. Primes

1.0 s, 256 MB

A prime number is a natural number greater than 1 and has exactly 2 divisors which are 1 and the number itself.

You are given a **prime** number n, find any 2 **prime** numbers a and b such that $a+b=n$ or state that no such pair of primes exists.

Input

The input contains a single prime number $n(2 \leq n \leq 10^7)$.

Output

If there doesn't exist any 2 primes such that their summation is equal to n then print -1, otherwise print the 2 primes on a single line separated by a space.

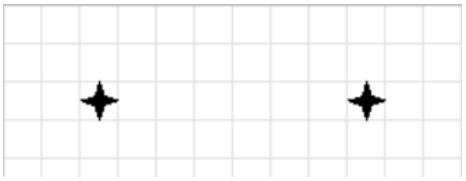
input
5
output
2 3

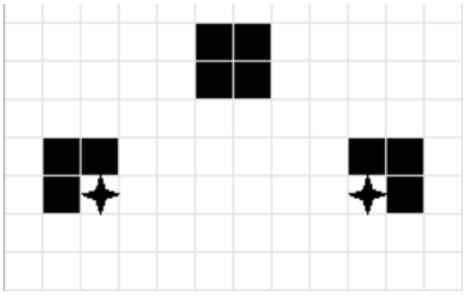
input
11
output
-1

D. Robots Easy

1.0 s, 256 MB

Alice was playing her favorite game, "Tales of the Abyss", while playing she encountered the following puzzle that can be described as a 12×12 grid:





A robot is standing somewhere in this grid, you can order the robot to move up, down, right or left. The robot can't move to a blocked cell(fully black cell), but it can move to other cells(white and crossed cells). If you order the robot to move to a blocked cell or to move outside the grid then the robot won't move.

The goal of the puzzle is to move the robot to a crossed cell in at most 1000 moves. You will be given the description of some levels of this puzzle that Alice has solved, can you solve them too?

Input
In the first line you will be given the integer $L(1 \leq L \leq 134)$, the number of levels you need to solve.

Then you will be given L lines describing the levels, each line will contain two integers $r, c(1 \leq r, c \leq 12)$, the row and column of the cell the robot is currently standing at, it's guaranteed that this cell is not a blocked cell(not a fully black cell). The rows are numbered from top(1) to bottom(12), and columns are numbered from left(1) to right(12).

Output
For each level output **exactly** 2 lines, the first line containing a single integer $n(0 \leq n \leq 1000)$, representing the number of moves you want to make, and the second line a string of length n made of the letters 'U','D','R' and 'L'(upper_case) meaning Up, Down, Right and Left describing the moves.

Please note that in order to get accepted you have to follow the above format exactly, printing the number of moves and the string on the same line, or printing lower_case letters instead of upper_case for example might give you a wrong answer verdict.

input
2 2 3 9 4
output
4 UUDD 3 LDL

In the first level, the robot moves as follows:
$(2,3) \rightarrow (1,3) \rightarrow (1,3) \rightarrow (2,3) \rightarrow (3,3)$

In the second level, the robot moves as follows:
$(9,4) \rightarrow (9,4) \rightarrow (10,4) \rightarrow (10,3)$

E. Card Game

1.0 s, 256 MB

Zeyad and Ehab are playing a simple card game, each player initially has a deck of n cards numbered from 1 to n, the game lasts n turns and in each turn both players privately choose one card and then both players reveal the chosen cards, the player that chose the card with the higher number earns points equal to that number, for example if Ehab chooses 4 and Zeyad chooses 6 Zeyad earns 6 points, if the numbers chosen are equal no one earns any point, the cards chosen do not return to the deck, they are discarded instead.

Ehab doesn't care about winning or losing, he cares about mathematical values of the game, specifically he wants to know the expected number of points he'll earn considering all possible outcomes, can you help him?

Input
The first and only line of input contains a single integer $n(1 \leq n \leq 10^6)$.

Output
Print a real number, the expected number of points Ehab will earn in the game.

The answer is considered correct if the absolute or relative error is not greater than 10^{-6}.

input
3
output
2.6666666667

input
7
output
16.0000000000

F. Thanos Power

1.0 s, 256 MB

After gathering all the infinity stones and dusting half the population of the universe, Thanos went to gardens street. He decided to plant some flowers using the reality stone.

So Thanos now wants to plant N flowers in least number of steps needed. In each step he can: Choose a number $(0 \leq x)$,then Plant 10^x plants or remove 10^x plants with the help of the power stone. What is the least number of steps he needs to plant exactly N flowers.

Input
A single integer N $(0 \leq N \leq 10^{10^5})$, the number of flowers Thanos wants to plant.

Output
The least number of steps Thanos needs to plant N plants.

input
3000
output
3

input
231

output
6

In the first sample, fastest way to plant 3000 plants is:

step 1 plant 10^3

step 2 plant 10^3

step 3 plant 10^3

so the answer is 3 steps.

G. Military Class

1.0 s, 256 MB

There is a military class of $2 * n$ soldiers, and the commander wants all of them to get partnered into n pairs. He divides the soldiers into two lines of length n, and numbers the soldiers in both lines from 1 to n.

The i_{th} numbered soldiers in the first line can be partnered with the j_{th} numbered soldiers in the second line if $|i - j| \leq e$. However, there are k pairs of soldiers that cannot be paired together. You need to print the number of ways you can match the soldiers into n pairs such that the constraints above are met. One way is different than the other if at least one soldiers has a different partner.

Input

The first line contains 3 integers $n, e, k (1 \leq n \leq 2000, 0 \leq e \leq 4, 0 \leq k \leq 2000)$ the number of soldiers in each line, the value that determines the range, and the number of invalid pairs, respectively.

Each of the next k lines contains two integers $u_i, v_i (1 \leq u_i, v_i \leq n)$, the number of the soldiers from the first line and the number of the soldiers from the second line that cannot be matched together respectively. No pair of soldiers will appear twice in the input.

Output

Output the number of ways modulo $10^9 + 7$, on a single line.

input
2 1 0
output
2

input
2 1 1 1 2
output
1