O. Fibonacci – Hard Version

time limit per test: 1.5 s

memory limit per test: 256 megabytes

Rintaro Okabe and Christina lost track of time and forgot the maths tasks. They were required to answer multiple queries about Fibonacci numbers.

Fibonacci numbers are defined as:

$$F_0 = 0$$

$$F_1 = 1$$

$$F_i = F_{i-1} + F_{i-2}$$

Each query is on the form **L R**, it means they should calculate $\sum_i F_i$ where $L \le i \le R$

NOTE: print all queries modulo $10^9 + 7$

Input

The first line contains a single integer Q $(1 \le Q \le 10^5)$, denoting the number of queries.

Each of the next Q lines contains two numbers, $(1 \le L \le R \le 10^{18})$

Output

Print Q lines, each lines contains the answer to the query.

Examples

input
```
3
2 8
3 5
1 4
```

output
```
53
10
7
```

input
```
3
25 99999999998
99998 1111111999998
2314 22457879512315
```

output
```
224666908
399869554
850662413
```

Contest #1

Finished

Contest Manager

→ **About Time Scaling**

This contest uses time limits scaling policy (depending on a programming language). The system automatically adjusts time limits by the following multipliers for some languages. Despite scaling (adjustment), the time limit cannot be more than 30 seconds. Read the details by the link.

→ **Virtual participation**

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

[Start virtual contest]

→ **Clone Contest to Mashup**

You can clone this contest to a mashup.

[Clone Contest]

→ **Invitations**

You can invite users to this contest. It will become visible to them regardless of contest visibility.

[Manage invitations]

→ **Administration**

Currently, manager mode is enabled. It means that you have manager access to this mashup contest.

Do you want to temporary disable manager mode?

[Disable manager mode]

→ **Submit?**

Language: GNU G++20 13.2 (64 bit, win ▾)

Choose file: [Choose File] No file chosen

[Submit]

→ **Last submissions**

Submission	Time	Verdict
268298649	Jul/01/2024 12:39	Accepted
267242934	Jun/25/2024 03:13	Accepted