Switches

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2.5 seconds
Memory limit:	1024 megabytes

Otter is designing a new game!

In this game, there are N switches. All switches are off initially. The player can repeatedly choose and press a switch which is currently off, until a stopping criterion is met. This stopping criterion, which is unknown to players, is defined as follows: if there are at least K switches on in a row, the game stops immediately.

To give prize to those who manage to press more switches, otter wants to know the expected number of switches on before the game ends (assuming that players have zero experience with this game and are hence randomly choosing unpressed switches to press in each iteration).

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10$). Description of the test cases follows.

The only line for each test case contains two integers N and K ($1 \leq K \leq N \leq 10000$), which are the total number of switches and the maximum length of consecutive pressed switches, respectively.

Output

For each test case print the answer, modulo $10^9 + 7$.

Formally, let $M = 10^9 + 7$. It can be shown that the answer can be expressed as an irreducible fraction $\frac{p}{q}$, where p and q are integers and $q \not\equiv 0 \pmod{M}$. Output the integer equal to $p \cdot q^{-1} \pmod{M}$. In other words, output such an integer x that $0 \leq x < M$ and $x \cdot q \equiv p \pmod{M}$.

Scoring

Subtask 1: Sample testcases (0 points)

Subtask 2: $N \leq 10$ (5 points)

Subtask 3: $N \leq 3000$ (45 points)

Subtask 4: $100 \leq K$ (50 points)

Example

standard input	standard output
3 3 2 15 2 40 15	333333338 141946947 164266036

Note

For the first test case, these are all possible sequences of switches toggles in a complete game:

1. `(1, 2)` - 2 switches pressed
2. `(1, 3, 2)` - 3 switches pressed
3. `(2, 1)` - 2 switches pressed
4. `(2, 3)` - 2 switches pressed

5. `(3, 1, 2)` - 3 switches pressed

6. `(3, 2)` - 2 switches pressed

The probability of having each sequence is $\frac{1}{6}$, hence the expected numner of pressed switches is $\frac{14}{6}$. As $333333338 \cdot 6 = 14 \pmod{M}$, where $M = 10^9 + 7$, 333333338 is the answer.