Summing the K-N series

Mandarin | Russian | Japanese

You are given a sequence whose n^{th} term is

$$T_n = n^K$$

You have to evaluate the series

$$S_n = T_1 + T_2 + T_3 + \cdots + T_n$$

Find $S_n \bmod (10^9 + 7)$.

Input Format

The first line of input contains T, the number of test cases.

Each test case consists of one line containing two space-separated integers n and K.

Output Format

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

Constraints

$1 \leq T \leq 10$
$0 \leq K \leq 10^3$
$1 \leq n \leq 10^{16}$

Sample Input

```
3
5 3
4 2
4 1
```

Sample Output

```
225
30
10
```

Explanation

Case 1: We have $225 = 1^3 + 2^3 + 3^3 + 4^3 + 5^3$
Case 2: We have $30 = 1^2 + 2^2 + 3^2 + 4^2$
Case 3: We have $10 = 1^1 + 2^1 + 3^1 + 4^1$