Random Variables

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	64 megabytes

There are n random variables. Each of them is chosen uniformly at random from $[1, m] \cap \mathbb{Z}$.

Let occ_i, where $i \in [1, m] \cap \mathbb{Z}$, denote the number of times the value i occurs among the n variables. Let $M = \max\{occ_i | i \in [1, m] \cap \mathbb{Z}\}$.

For example, if $n = 5, m = 5$, the variables can be $\{4, 4, 3, 1, 5\}$ with probability $\frac{1}{3125}$. We have $occ_1 = 1$, $occ_2 = 0$, $occ_3 = 1$, $occ_4 = 2$, $occ_5 = 1$, $M = \max\{1, 0, 1, 2, 1\} = 2$.

Now you're given n and m; please work out the expected value of M. For convenience, let's denote the answer as $\mathrm{E}(M)$, then you only need to output $\mathrm{E}(M) \times m^n$ modulo p.

Input

The first line contains two positive integers T and p ($1 \le T \le 10^4$, $2 \le p \le 10^9 + 7$) — the number of test cases and the modulus.

The following T lines each contain two positive integers n and m ($1 \le n \le 1000$, $1 \le m \le 10^9$) — the number of random variables and the upper bound of each random variable.

It is guaranteed that the sum of n over all test cases does not exceed 10^4.

Output

For each test case, print one line, a single integer — $\mathrm{E}(M) \times m^n$ modulo p.

Example

standard input	standard output
3 123456789 3 2 5 5 7 7	18 7145 2066323

Note

In the first test case, for results $\{1, 1, 2\}, \{1, 2, 1\}, \{1, 2, 2\}, \{2, 1, 1\}, \{2, 1, 2\}, \{2, 2, 1\}$, M equals 2; for results $\{1, 1, 1\}, \{2, 2, 2\}$, M equals 3. So, the total result is $1 \times 0 + 2 \times 6 + 3 \times 2 = 18$, which equals 18 modulo 123456789 .