



Problem E

Easy Counting Problem

Time limit: 3 seconds

Memory limit: 1 GB

Problem Description

Given an array A , you may perform the following operation zero or more times:

- Choose an index i ($1 \leq i \leq |A|$) such that $A_i = i$ and delete the i -th element from the array A .
- Formally, replace A with $A[1, i - 1] + A[i + 1, |A|]$ where $A[L, R]$ represents the subarray $[A_L, A_{L+1}, A_{L+2}, \dots, A_R]$ and $+$ represents array concatenation.

Let $f(A)$ denote the **minimum possible length** of A after applying operations optimally.

You are given integers N and M , find the sum of $f(A)$ over all M^N arrays of size N and satisfying $1 \leq A_i \leq M$ for all $1 \leq i \leq N$. Since the answer may be large, output it modulo 998244353.

Input Format

- The first line of input will contain a single integer T , denoting the number of test cases.
- The first and only line of input for each test case contains 2 integers N and M .

Output Format

For each test case, output on a new line the sum of $f(A)$ over all arrays of length N and elements bounded by M , modulo 998244353.

Constraints

- $1 \leq T \leq 10$
- $1 \leq N, M < 998244353$
- $|N - M| \leq 2000$



Samples

Sample Input 1

```
9
2 2
2 1
3 1
3 2
3 3
3 5
6 3
23 10
900000000 900000000
```

Sample Output 1

```
3
0
0
9
44
284
2534
243195864
193285282
```

Sample Explanation

Test case 1: There are $2^2 = 4$ possible arrays. Their respective values are:

- $f([1, 1]) = 0$. First apply the operation with $i = 1$. Then, A becomes $[1]$, and we can apply the operation with $i = 1$ again, resulting in an empty array.
- $f([1, 2]) = 0$. First apply the operation with $i = 2$, and then with $i = 1$.
- $f([2, 1]) = 2$. No operations are possible.
- $f([2, 2]) = 1$. Apply the operation with $i = 2$.

The sum is 3.
