Problem A. Shortest Paths on Random Forests

Input file:	`standard input`
Output file:	`standard output`
Time limit:	6 seconds
Memory limit:	1024 megabytes

Here is a problem related to forest, which is a special type of graph. Before introducing this problem to you, we intend to show some definitions used in this problem. A labelled forest with n vertices is an acyclic undirected simple graph in which vertices are labelled by $1, 2, \cdots, n$. Two labelled forests are regarded as different if their numbers of vertices are different or, if they have the same number of vertices, for some integers i and for vertices labelled by i in these two forests, their neighbours have different labels (which means that the sets of labels corresponding to all neighbours of vertices labelled by i in these two forests are different).

Tree-like structures are constructed in computer programming constantly, which is the most fascinating part Bob has ever seen. Today, Bob wants to randomly choose a labelled forest G from all possible labelled forests having n vertices with equal probability. Then, he will set $\delta(i, j)$ to the number of edges on the shortest path from the vertex labelled i to the vertex labelled j if the shortest path exists, or set $\delta(i, j)$ to m otherwise. Bob is curious about the expected value of

$$\sum_{i=1}^{n} \sum_{j=i+1}^{n} \delta^2(i, j),$$

but it's hard for him. Can you help Bob find out the expected value modulo 998244353?

More precisely, if the reduced fraction of the expected value is $\frac{p}{q}$, what you should provide is the minimum non-negative integer r such that $qr \equiv p \pmod{998244353}$.

Input

The input contains several test cases, and the first line contains a positive integer T indicating the number of test cases which is up to 2×10^5.

For each test case, the only one line contains two integers n and m where $1 \le n \le 2 \times 10^5$ and $n \le m \le 998244352$.

We guarantee that the modular multiplicative inverse of q in each test case always exists, in other words, the condition $q \not\equiv 0 \pmod{998244353}$ is guaranteed to be true in all test cases.

Output

For each test case, output a line containing the answer modulo 998244353.

Example

standard input	standard output
4 1 1 2 3 3 7 4 16	0 5 66 576