
Problem A. Binary Numbers

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 512 megabytes

ZYB is a smart guy. He is figuring out a problem about binary numbers.

Let a_i be the i -th (0-based indexing) least significant bit in the binary representation of a . For example, if $a = 2$, then $a_0 = 0, a_1 = 1$, and $a_i = 0$ for $i \geq 2$. Define $F_k(a, b)$ as:

$$F_k(a, b) = \begin{cases} F_{k-1}(a, b) + 1 & (a_k = b_k) \\ 0 & (a_k \neq b_k) \end{cases}$$

Specifically, $F_{-1}(a, b) = 0$.

ZYB has N intervals $[L_1, R_1], [L_2, R_2], \dots, [L_n, R_n]$ where $L_1 = 0, R_n = 2^m - 1$, and $\forall i \in [1, n-1] : R_i + 1 = L_{i+1}$. He wants to select N integers A_1, A_2, \dots, A_n so that $A_i \in [L_i, R_i]$, and for each $i \in [1, n]$, the following condition holds:

$$\forall k \in [L_i, R_i] : F_{m-1}(A_i, k) \geq \max_{1 \leq j \leq N} \{F_{m-1}(A_j, k)\}$$

The value of the sequence A is defined as $V(A) = \prod_{i=1}^n A_i$.

Of course, there are multiple ways to select the sequence A . Now ZYB wonders what is the sum of $V(A)$ among all different sequences he can select. Two sequences P and Q are different if and only if $\exists i \in [1, n] : P_i \neq Q_i$. Because the answer could be quite large, he only wants to know the answer modulo 100 000 007.

Input

The input contains multiple cases. The first line of the input contains a single integer T ($1 \leq T \leq 100$), the number of cases.

For each case, the first line of the input contains two integers m ($0 \leq m \leq 17$) and N ($1 \leq N \leq 2^m$). The following N lines each contains two integers L_i and R_i ($0 \leq L_i \leq R_i < 2^m$).

It's guaranteed that the sum of 2^m over all cases doesn't exceed 2^{18} .

Output

For each case, print a single integer in a single line, the sum of $V(A)$ modulo 100 000 007.

Example

standard input	standard output
1	5
2 2	
0 1	
2 3	