Equal Sums

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

After learning Elegia's mind on how to use generating function tricks to solve combinatorial counting problems, Little Cyan Fish would like to solve the following problem.

Little Cyan Fish has $n+m$ integers, denoted by $x_1, x_2, \cdots, x_n$ and $y_1, y_2, \cdots, y_m$. Little Cyan Fish knows that:

- $l_i^{(x)} \le x_i \le r_i^{(x)}$ for all $1 \le i \le n$.
- $l_j^{(y)} \le y_j \le r_j^{(y)}$ for all $1 \le j \le m$.

Little Cyan Fish has not decided the exact value of x_i and y_j. He is wondering, for any pair of integers (a, b) $(1 \le a \le n,\ 1 \le b \le m)$, how many ways there are to set the value of x_i $(1 \le i \le a)$ and y_j $(1 \le j \le b)$, such that the sum $\sum_{i=1}^{a} x_i$ equals $\sum_{j=1}^{b} y_j$. As the number can be quite large, you only need to output it modulo 998 244 353.

Input

The first line of the input contains two integers n and m $(1 \le n, m \le 500)$.

The next n lines describe the constraints of the array $x_1, x_2, \cdots, x_n$. The i-th line of these lines contains two integers $l_i^{(x)}$ and $r_i^{(x)}$ $(1 \le l_i^{(x)} \le r_i^{(x)} \le 500)$, indicating a constraint.

The next m lines describe the constraints of the array $y_1, y_2, \cdots, y_m$. The j-th line of these lines contains two integers $l_j^{(y)}$ and $r_j^{(y)}$ $(1 \le l_j^{(y)} \le r_j^{(y)} \le 500)$, indicating a constraint.

Output

Output n lines, each of which contains m integers. The b-th integer in the a-th line indicates the number of ways to set the values of $x_1, x_2, \cdots, x_a$ and $y_1, y_2, \cdots, y_b$ so that $\sum_{i=1}^{a} x_i = \sum_{j=1}^{b} y_j$, modulo 998 244 353.

Example

standard input	standard output
2 3 1 2 2 3 1 4 2 2 1 3	2 0 0 3 4 4

Note

For $a = 1$ and $b = 1$, there are two ways to set the values, as follows:

x_1	y_1
1	1
2	2

For $a = 2$ and $b = 1$, there are three ways to set the values, as follows:

x_1	x_2	y_1
1	2	3
1	3	4
2	2	4

For $a = 2$ and $b = 2$, there are four ways to set the values, as follows:

x_1	x_2	y_1	y_2
1	2	1	2
1	3	2	2
2	2	2	2
2	3	3	2

For $a = 2$ and $b = 3$, there are four ways to set the values, as follows:

x_1	x_2	y_1	y_2	y_3
1	3	1	2	1
2	2	1	2	1
2	3	1	2	2
2	3	2	2	1