# Equal Sums

| | |
|---|---|
| Input file: | `standard input` |
| Output file: | `standard output` |
| Time limit: | 3 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<br>1 2<br>2 3<br>1 4<br>2 2<br>1 3 | 2 0 0<br>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 |