Problem 2: Matrix Multiplication (matrix)

Given an $R_A \times C_A$ matrix A and an $R_B \times C_B$ matrix B, with $1 \le R_A, R_B, C_A, C_B \le 300$, write a program that computes the matrix product $C = AB$. All entries in matrices A and B are integers with absolute value less than 1000, so you don't need to worry about overflow. If matrices A and B do not have the right dimensions to be multiplied, the product matrix C should have its number of rows and columns both set to zero.

Use the code at `https://6.s096.scripts.mit.edu/grader/text/matrix/matrix.zip` as a basis for your program–the input/output needed is already written for you. Matrices will be stored as a structure which we'll `typedef` as `Matrix`. This structure will contain the size of our matrix along with a statically-sized two-dimensional array to store the entries.

```
#define MAXN 300
typedef struct Matrix_s {
  size_t R, C;
  int index[MAXN][MAXN];
} Matrix;
```

Of course, this is rather inefficient if we need to create a lot of matrices, since every single matrix struct holds `MAXN*MAXN` ints! For this problem, we only use three matrices, so it's fine for this use, but we'll see how to dynamically allocate a matrix in problem **matrix2**.

Input Format

Line 1: Two space-separated integers, R_A and C_A.
Lines $2 \ldots R_A + 1$: Line $i + 1$ contains C_A space-separated integers: row i of matrix A.
Line $R_A + 2$: Two space-separated integers, R_B and C_B.
Lines $R_A + 3 \ldots R_A + R_B + 4$: Line $i + R_A + 3$ contains C_B space-separated integers: row i of matrix A.

Sample Input (file matrix.in)

```
3 2
1 1
1 2
-4 0
2 3
1 2 1
3 2 1
```

Output Format

Line 1: Two space-separated integers R_C and C_C, the dimensions of the product matrix C.
Lines $2 \ldots R_C + 1$: Line $i + 1$ contains C_C space-separated integers: row i of matrix C.

If A and B do not have the right dimensions to be multiplied, your output should just be one line containing `0 0`.

Sample Output (file matrix.out)

```
3 3
4 4 2
7 6 3
-4 -8 -4
```

Output Explanation

We are given

$$A = \begin{pmatrix} 1 & 1 \\ 1 & 2 \\ -4 & 0 \end{pmatrix} \text{ and } B = \begin{pmatrix} 1 & 2 & 1 \\ 3 & 2 & 1 \end{pmatrix}$$

so the product is the 3×3 matrix

$$AB = \begin{pmatrix} 1 & 1 \\ 1 & 2 \\ -4 & 0 \end{pmatrix} \begin{pmatrix} 1 & 2 & 1 \\ 3 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 4 & 4 & 2 \\ 7 & 6 & 3 \\ -4 & -8 & -4 \end{pmatrix}.$$