Nested Matrix

A nested matrix is: each element of matrix can be a matrix or a primitive integer.

For example:

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$$\begin{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} & \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} \end{bmatrix}$$

or

$$\begin{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} & \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} \\ \begin{bmatrix} 9 & 10 \\ 11 & 12 \end{bmatrix} & \begin{bmatrix} 13 & 14 \\ 15 & 16 \end{bmatrix} \end{bmatrix}$$

Definition for matrix operations:

Operation 0: visit and print all of the elements in the matrix with row priority

For example:

Given:

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

return: 1 2 3 4

Given:

$$\begin{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} & \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} \end{bmatrix}$$

return: 1 2 3 4 5 6 7 8

Operation 1: flatten matrix

Definiton for flatten nested matrix: a matrix can be flattened if and only if row = 1, col = 1

M = $[A]$

return M = A

For example:

Given: M = $[1]$

return: 1

Operation 2: add matrix A with matrix B, see also:

https://en.wikipedia.org/wiki/Matrix_addition

For nested matrix addition, same as normal matrix but add each elements recursively .

For example:

A = $\begin{bmatrix} A11 & A12 \\ A21 & A22 \end{bmatrix}$

B = $\begin{bmatrix} B11 & B12 \\ B21 & B22 \end{bmatrix}$

return:

A * B = $\begin{bmatrix} A11 + B11 & A12 + B12 \\ A21 + B21 & A22 + B22 \end{bmatrix}$

For example:

Given:

A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

B = $\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

return:

A + B = $\begin{bmatrix} 6 & 8 \\ 10 & 12 \end{bmatrix}$

Operation 3: multiply matrix A with matrix B, see also:
https://en.wikipedia.org/wiki/Matrix_multiplication

For nested matrix multiplication, same as normal matrix but multiply each elements recursively .

For example:

A = $\begin{bmatrix} A11 & A12 \\ A21 & A22 \end{bmatrix}$

B = $\begin{bmatrix} B11 & B12 \\ B21 & B22 \end{bmatrix}$

return:

A * B = $\begin{bmatrix} A11 * B11 + A12 * B21 & A11 * B12 + B12 * B22 \\ A21 * B11 + A22 * B21 & A21 * B12 + A22 * B22 \end{bmatrix}$

For example:

Given:

A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

B = $\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

return:

A * B = $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

Note:

1. Matrices can auto flatten to suitable structure when they are applying addition or multiplication.
2. All given operations is valid.
3. Matrix number is less than 20, and Operand (OP<n>, in add/mul OP1 OP2 OP3) is less than 20.

INPUT

```
2         // we have 2 matrices
2 2 2 1 1  // the 1st matrix comes with row = 2, col = 2, nested depth = 2, and each element is a matrix with row = 1, col = 1
1 2 3 4  // the data is [[1],[2];[3],[4]] or you can mark it as [1,2;3,4] as you like
1 2 2    // the 2nd matrix comes with row = 2, col = 2, nested depth = 1
5 6 7    // the data is [5,6;7,8] or you can mark it as [[5],[6];[7],[8]] as you like
4        // we hava 4 operations
2 0 1 2  // operation 2: add the 1st matrix with the 2nd matrix, and store result in the 3rd one
0 2      // operation 0: print the 3rd matrix
3 0 1 2  // operation 3: add the 1st matrix with the 2nd matrix, and store result in the 3rd one
0 2      // operation 0: print the 3rd matrix
```

OUTPUT

```
6 8 10 12
19 22 43 50
```