Orthonormal matrices   X43660_en

A square $n \times n$ matrix Q is *orthonormal* if and only if its transpose equals its inverse: $Q^T = Q^{-1}$. That is, if and only if $Q \cdot Q^T = Q^T \cdot Q = I_n$, where I_n is the $n \times n$ identity matrix. Write a function `orthonormal_matrix` that returns true if and only if a given non-empty square matrix Q is orthonormal.

Use definitions and functions of the previous problems conveniently and define whatever other functions or procedures you might need.

Write a program that reads a sequence of non-empty square matrices and for each one prints "yes" if it is orthonormal and "no" otherwise. The sequence of input matrices follows the same conventions as in the problems *Is identity?* and *Transpose*, with the additional restriction that they are always square matrices. The output follows the same format as in the problem *Is identity?*.

Exam score: 2.5 **Automatic part:** 20%

Input

The input consists in a sequence of non-empty square matrices. For every matrix we have its dimensions $n, m \geq 1$ ($n = m$ always holds), followed by its elements in row order. Every integer is separated by the next one by a blank space and each row is ended with a line break. Two consecutive matrices are separated by a blank line.

Output

Print yes or no for every matrix in the input sequence, according to whether the matrix is orthonormal or not. Separate consecutive answers with a blank space and end the output with an end-of-line.

Sample input

```
2 2
1 0
2 -1

2 2
0 1
1 0

3 3
1 0 0
0 0 1
0 1 0

3 3
1 1 0
0 1 0
1 0 1

3 3
0 -1 0
1 0 0
0 0 -1

3 3
1 0 -1
-1 0 0
0 0 1
```

Sample output

```
no yes yes no yes no
```

Problem information

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