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## Football corruption

P84060\_en

Setzè Concurs de Programació de la UPC - Final (2018-09-19)

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An infamous football club (let us call it  $X$ ) wants to buy yet another competition. There are  $n$  teams, where  $n = 2^m$  for some  $m$ . As usual, the tournament scheme is a complete binary tree, so  $X$  will have to win  $m$  matches to be the champion. The president of  $X$  knows, for every pair of teams  $i$  and  $j$ , the probability  $p_{ij}$  that  $i$  eliminates  $j$ . So he will bribe the football federation, and arrange the play offs so as to maximize the probability that  $X$  wins the competition. Can you compute that probability?

### Input

Input consists of several cases, each one with  $n$ , followed by  $n$  lines with  $n$  probabilities each, where the  $j$ -th number of the  $i$ -th line is  $p_{ij}$ . Assume  $1 \leq m \leq 3$ , that  $p_{ji} = 1 - p_{ij}$  for every  $i \neq j$ , and that the diagonal of the matrix has only  $-1$ .  $X$  is the first team.

### Output

For every case, print the probability with four digits after the decimal point. The input cases have no precision issues.

### Hint

The expected solution is a “reasonable” backtracking. For instance, 2000 tests with  $n = 8$  should be solved in at most one second.

### Sample input

```
2
-1 0.6
0.4 -1

4
-1 1 0.5 0
0 -1 0.7 0.8
0.5 0.3 -1 0.1
1 0.2 0.9 -1

8
-1 0.1 0.2 0.3 0.4 0.5 0.6 0.7
0.9 -1 0.9 0.8 0.7 0.6 0.5 0.4
0.8 0.1 -1 0.1 0.2 0.3 0.4 0.5
0.7 0.2 0.9 -1 0.5 0.6 0.7 0.8
0.6 0.3 0.8 0.5 -1 0.2 0.4 0.6
0.5 0.4 0.7 0.4 0.8 -1 0.8 0.4
0.4 0.5 0.6 0.3 0.6 0.2 -1 0.3
0.3 0.6 0.5 0.2 0.4 0.6 0.7 -1
```

### Sample output

```
0.6000
0.4000
0.1100
```

### Problem information

Author : Salvador Roura

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