CCO '18 P2 - Wrong Answer

Canadian Computing Olympiad: 2018 Day 1, Problem 2

Troy made the following problem (titled WA) for a programming contest:

> There is a game with N levels numbered from 1 to N. There are two characters, both are initially at level 1. For $i < j$, it costs $A_{i,j}$ coins to move a character from level i to level j. It is not allowed to move a character from level i to level j if $i > j$. To win the game, every level (except level 1) must be visited by exactly one character. What is the minimum number of coins needed to win?

JP is a contestant and submitted the following Python solution.

```
def Solve(N, A):
    # A[i][j] is cost of moving from level i to level j
    # N is the number of levels
    x, y, sx, sy = 1, 1, 0, 0 # Initialize x and y to 1, sx and sy to 0
    for i in range(2, N + 1): # loop from 2 to N
        if sx + A[x][i] < sy + A[y][i]
            sx += A[x][i]
            x = i
        else:
            sy += A[y][i]
            y = i
    return sx + sy
```

Troy is certain that JP's solution is wrong. Suppose for an input to WA, JP's solution returns X but the minimum number of coins needed is Y. To show how wrong JP's solution is, help Troy find an input N and $A_{i,j}$ such that $\frac{x}{y}$ is maximized.

Input Specification

There is no input.

Output Specification

Print an input to WA in the following format:

On the first line, print one integer $N\,(2 \leq N \leq 100)$.

Then print $N-1$ lines; the i-th line should contain $N-i$ integers $A_{i,i+1}, \ldots, A_{i,N}\,(1 \leq A_{i,j} \leq 100)$.

If your output is not in the correct format, it will get an *incorrect* verdict on the sample test in the

grader and score 0 points.

Otherwise, suppose that for your input, JP's solution returns X but the minimum number of coins needed is Y. Then you will receive $\left\lceil \min\left(25, \frac{X}{4Y}\right) \right\rceil$ points where $\lceil Z \rceil$ is the greatest integer that is not greater than Z.

Sample Output

```
5
1 2 3 4
10 9 8
7 6
5
```

Explanation for Sample Output

The optimal way to win the game is for one character to visit level 2 and the other character to visit levels 3, 4 and 5. This costs $(1) + (2 + 7 + 5) = 15$ coins. JP's solution returns 18. Thus $\frac{X}{4Y} = \frac{18}{4 \times 15} = 0.3$, so this output will receive $\lceil 0.3 \rceil = 1$ point.