CS 124 Problem Set 1

Due: Tuesday, February 10, 2015 11:59 pm EST (**deadline passed**)

Problems | [Scores](#) | [Submit](#) | [Help](#) | [Log Out](#)

Problems

[Problem A - Adding](#)

[Problem B - Implications](#)

Problem B

Consider a mathematical theory with N statements, labeled 0 to N-1. These
statements are related by implications. For example, we can consider a theory
with 3 statements and the implications 0=>1 and 1=>2. Implication is a
transitive relationship; in the above example, 0=>2 also. Moreover,
let us suppose that there are no circular chains of implications in the theory;
in the above example, we cannot have 2=>0 or 2=>1.

Now consider a list T of implications in a theory with N statements. Because
of the transitivity property of implications, some of the implications are
redundant. Find the minimal set of implications S such that S and T represent
the same theory.

CONSTRAINTS
For test cases worth a total of 40 points:
0 ≤ N ≤ 10

For test cases worth a total of 60 points:
0 ≤ N ≤ 250

TIME LIMIT
1 second per test case. (2x for Java, 15x for Python)

INPUT FORMAT
First a line containing N, the number of statements.

Next N lines (0th line, 1st line, ..., (N-1)-st line) each containing a
sequence of integers separated by spaces. A number j on the i-th line
represents the implication i=>j.

OUTPUT FORMAT
N lines, where the i-th line is a sequence of space separated integers sorted
in increasing order, representing all statements in S implied by statement i.

SAMPLE INPUT
3
1 2
2

SAMPLE OUTPUT
1

2

DETAILS
There are 3 statements with the implications 0=>1, 0=>2, 1=>2.
Statement 2 does not imply anything (indicated by presence of empty line). The
minimal set of implications specifying the same theory is 0=>1 and 1=>2,
since these two implications imply 0=>2.

SAMPLE INPUT
4
1 2 3

1
2

SAMPLE OUTPUT
3

1
2

Based on the "Ultra Cool Programming Contest Control Centre" v1.7b by Sonny Chan
Modified for CS 124 by Neal Wu, with design help from Martin Camacho