Birla Institute of Technology & Science, Pilani
Data Structures & Algorithms (CS F211)
Lab Exam
(Closed Book)

Date: 17th April, 2016
Time: 2 Hours 45 minutes (4 problems)
Total Marks: (4 + 6 + 10 + 20 = 40 Marks)

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General Instructions:

- There are four problems to solve in this lab exam.
- The problems are arranged in increasing order of difficulty. Weightage of each problem is approximately proportional to its difficulty level (P1 = 4, P2 =6, P3=10, P4=20).
- A total of 2 hours and 45 minutes will be given for solving all 4 problems.
- Only one test case in each problem will be available during first 2 hours and 30 minutes. All but one test case will be made available in last 15 minutes.
- Separate submission will be required for each of the problem. Make sure to select correct problem while uploading a solution.
- Each test case carries some marks. For any output, other than "correct", for a particular test case will be awarded zero (0) marks.
- All input expressions should be read from stdin and output should be printed on stdout.
- Only the last submission by the student for each problem, before end of exam, will be considered for evaluation.

Warnings (Possible Reasons for Cancellation of Lab Exam):

- Possession of any previously written code (irrespective of size, relevance, ownership, medium)
- Possession of any removable media or mobile.
- Attempt to access any machine other than allotted local machine and the Online Judge Server.

Input Format:

- The first line of input will specify the number of vertices in a directed graph.
- Vertices will always be numbered in sequential order starting from 1.
- Adjacency list representation of a directed graph is used.
- From second line onwards, adjacent vertices (in sorted order) of each vertex (in sorted order) will be listed per line in the following format:

Vertex number Blank Number of Adjacent vertex Blank First Adjacent vertex Blank ….

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Problem 3
(10 Marks)

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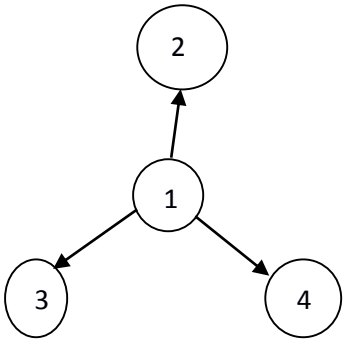
Problem Statement:

Finding Transpose of a directed graph. The transpose of a directed graph G = (V, E) is the graph $G^T = (V, E^T)$, where $E^T = \{< v, u > \in VxV; \ < u, v> \in E\}$. Thus, G^T is G with all its edges reversed. For example, $G1^T$ is the following directed graph:



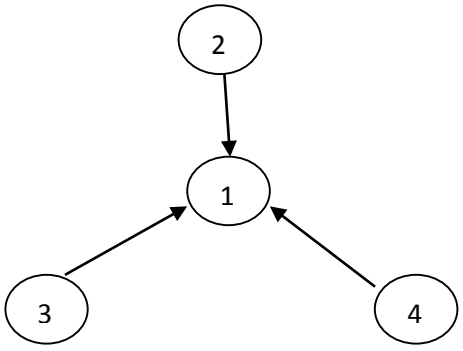
Graph $G1^T$

Output Format:

It is same as the input format for adjacency list.

Sample Input:

```
4
1    0
2    1    1
3    1    1
4    1    1
```



Graph G1

Sample Output:

```
4
1    3    2    3    4
2    0
3    0
4    0
```