

## Programming Assignment #3

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### Maximum path

Implement the algorithm to find the strongly connected components of a given directed graph  $G = \{ V, E \}$  where  $|V| = N$  and  $|E| = M$ :

1> This is textbook section 22.5 page 615. The pseudocode is on page 617.

2> Assume that nodes are labeled as 1, 2, 3, ..., N.

Analyze the time and space complexity of your algorithm.

Please note:

1> It is your decision to choose the representation of data structure and necessary attributes.

2> Your output should give number of strongly connected components.

Input format:

Line 1: N M                      ← number of vertices  $N = |V|$  and edges  $M = |E|$

Line 2:  $u_1 v_1$                       ← edge connection vertices  $u_1 \rightarrow v_1$

Line 3:  $u_2 v_2$                       ← edge connection vertices  $u_2 \rightarrow v_2$

...

Line 1+M:  $u_M v_M$                       ← edge connection vertices  $u_M \rightarrow v_M$

Output format:

Line 1: K                      ← K strongly connected components

Line 2:  $u_{11} u_{12} \dots u_{1k1}$                       ← vertices of 1<sup>st</sup> component

Line 3:  $u_{21} u_{22} \dots u_{2k2}$                       ← vertices of 1<sup>st</sup> component

...

Line K+1:  $u_{K1} u_{K2} \dots u_{Kk1}$                       ← vertices of 1<sup>st</sup> component

**Student Name:**

**Student ID:**

**Grading:**

( 50%) Correctness

( 10%) Documented time and space complexity analysis

( 10%) Performance ranking in class

( 5%) Coding style and documentation

( 5%) Clean compilation

( 15%) Modular design, test case design, golden generation

( 5%) Automation, performance data capture and/or comparison

(-20%) Late penalty per day

( -5%) Special service penalty

**Total score: 200**

**Final score:**