

Last name	
First name	
Group	

Grade	
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**Algorithmics**  
**Undergraduate 2<sup>nd</sup> year (S4)**  
**Midterm #4 (C4)**  
**5 March 2019 - 14 : 45**  
**Answer Sheets**

1	
2	
3	
4	
5	

*Answers 1 (Cut points, cut edges – 5 points)*

1. *Cut points of  $G_1$* : \_\_\_\_\_

2. *Cut edges of  $G_1$* : \_\_\_\_\_

3. The biconnected components of  $G_1$  are :

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4. The table of *prefix* and *higher* values is :

	<i>prefix</i>	<i>higher</i>
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

**Answers 2 (I want to be a tree – 8 points)**

1. *Definitions:*

① \_\_\_\_\_  
\_\_\_\_\_

② \_\_\_\_\_  
\_\_\_\_\_

2. (a) *Edges that can be removed:*

\_\_\_\_\_

(b) *the list of the edges of the graph "Not a tree yet" removed:*

\_\_\_\_\_

3. During the depth-first search, we assign to each vertex the number the component it belongs to (from 1 to  $k$ , if there are  $k$  components):

(a) *Number of edges to add:*

(b) *What are the edges to add, during the traversal?*

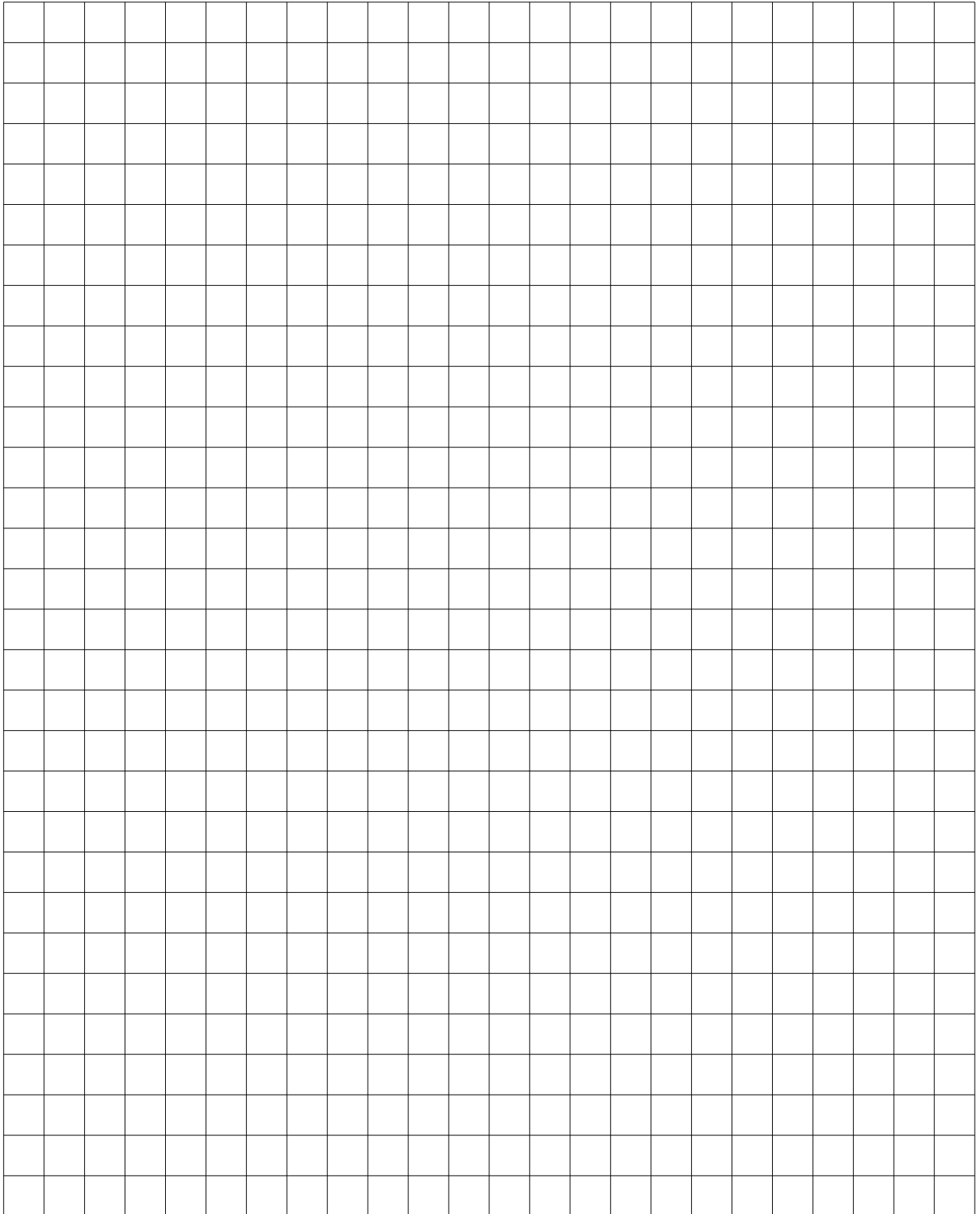
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(c) *the list of the edges of the graph "Not a tree yet" added:*

\_\_\_\_\_

4. Specifications:

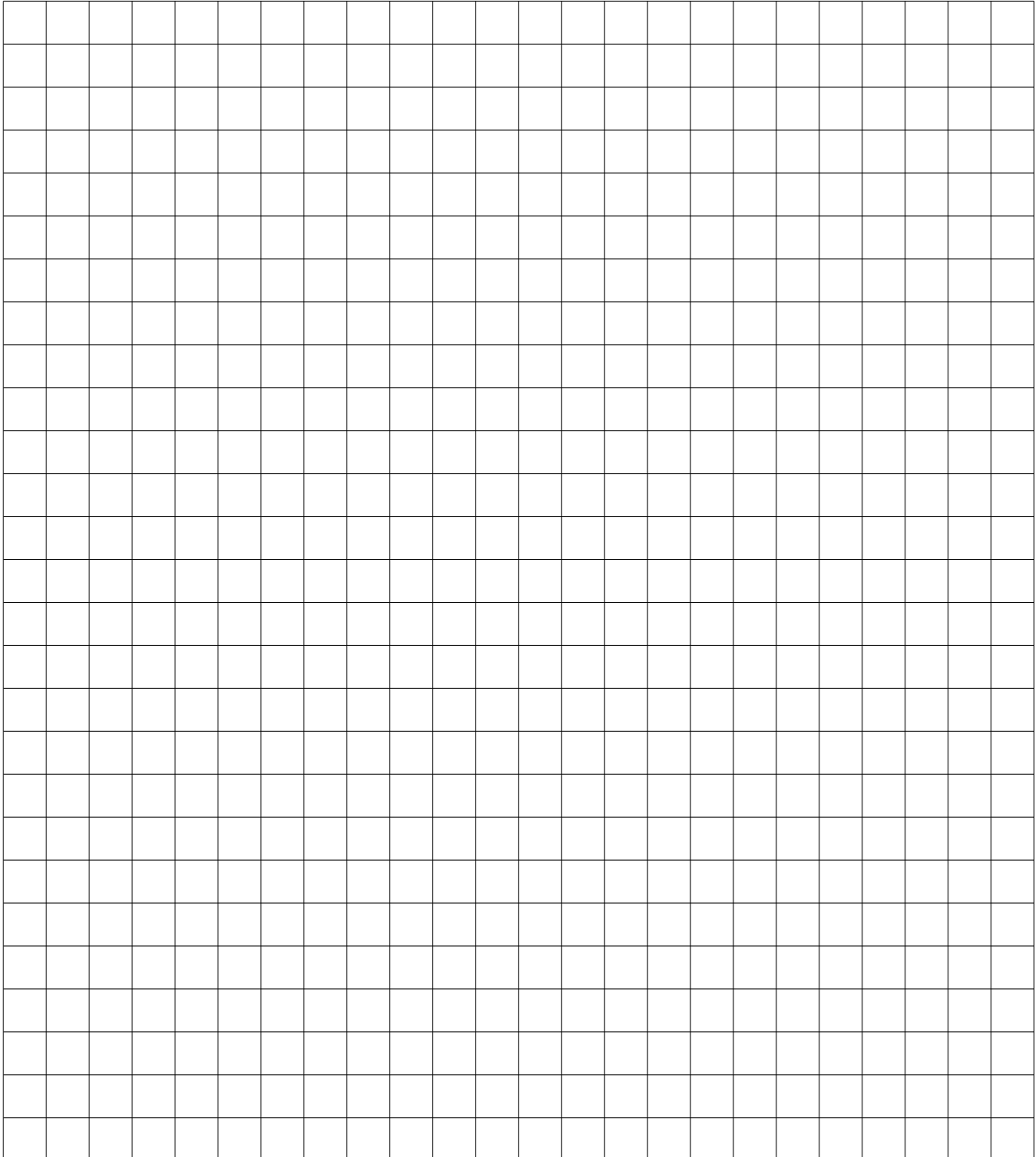
The function `make_me_tree(G)` turns the graph  $G$  into a tree and returns the connected component vector of the initial graph.



**Answers 3 (Condensation – 4 points)**

**Specifications:**

The function `condensation( $G$ ,  $scc$ )` builds the condensation  $G_R$  of a digraph  $G$ , with  $scc$  its component list. The function returns  $G_r$  and the vector of components: a vector that gives for each vertex the number the component it belongs to (the vertex in  $G_R$ ).



**Answers 4 (Digraphs and Mystery – 3 points)**

1.

	Call number	Returned result
(a) test( $G_2$ )		
(b) test( $G_3$ )		

2. What is the information returned by test( $G$ )?

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**Answers 5 (Saving Algernon – Bonus)**

1. (a) The kidnapper is the one of the lab \_\_\_\_\_

(b) Algernon is \_\_\_\_\_

2. \_\_\_\_\_

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