




Algorithmics and complexity

MCQ 1 – TD 3

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Duration: 10 minutes.

No document is allowed. Using a calculator or a phone is forbidden.

Questions with the symbol ♣ accept any number of correct answers (including none). Other questions only accept one correct answer.

Warning: tick the boxes properly, without scratch, and do not use correctors.

Question 1 ♣

Dijkstra's algorithm...

- ... has many similarities with the breadth-first search algorithm.
- ... only works on acyclic graphs.
- ... cannot work on trees.
- ... must be implemented with a priority queue.

Question 2

The value of the flow in a cut that separates the graph in two sets S (containing the source) and T (containing the target) is equal to:

- the sum of the flows of arcs from S to T.
- the sum of the flows of arcs from S to T minus the sum of the flows of arcs from T to S

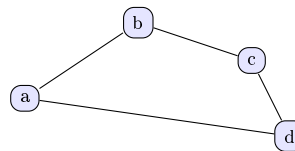
Question 3

For any given graph with n vertices, all Minimum Spanning Trees contain:

- n edges
- $n - 1$ edges
- n^2 edges
- between $n - 1$ and $n + 1$ edges

Question 4 ♣

Let us consider the following graph:



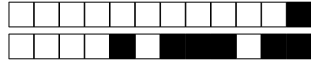
What is the result of a breadth-first search starting from vertex a ?

- a,b,c,d
- a,d,b,c
- a,c,b,d
- a,b,d,c
- a,d,c,b

Question 5

In the Minimum Spanning Tree problem, the weight is assigned to:

- vertices
- edges and vertices
- edges
- none of these



Question 6 ♣

At each step of its execution, Prim's algorithm guarantees

- that no cycle appears in the solution being computed
- that the solution being computed is connected

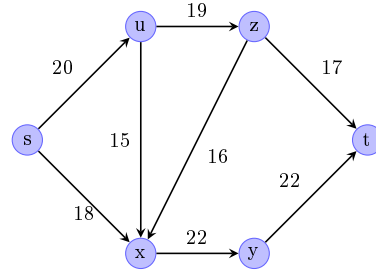
Question 7

In the flow problem, the goal is to find:

- a maximal cut
- a minimal cut
- an equidistributed flow

Question 8

The arcs in the following graph are marked with their capacity c . What is the capacity of the s - t cut: $\{s, u, x\}$ and $\{z, y, t\}$:



- 57
- 38
- 25
- 41

Question 9 ♣

What is the worst time complexity of Dijkstra's algorithm when the frontier is implemented with a simple list?

- $\mathcal{O}(|V| + |E|.log(|V|))$
- $\mathcal{O}(|V|^2 + |E|)$
- $\mathcal{O}(|V|^2)$
- $\mathcal{O}(|V|.log(|V|) + |E|)$