

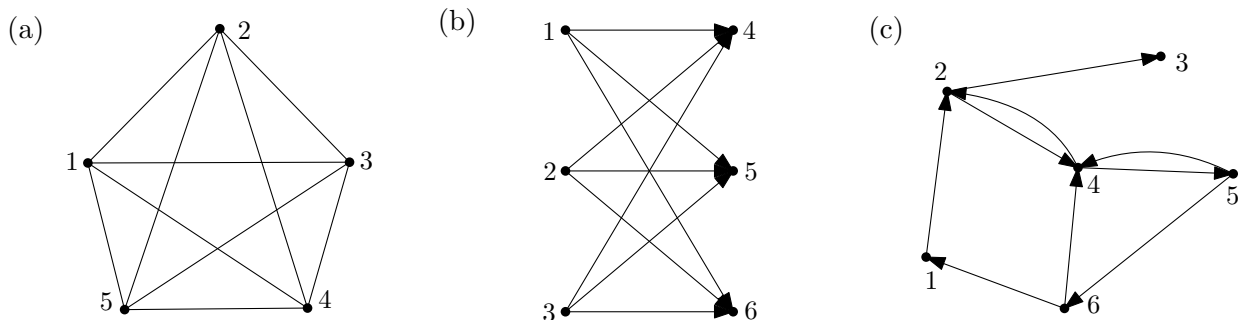


Algorithms and Data Structures Winter Term 2019/2020 Exercise Sheet 8

Remark: For this exercise, the material of the 12th video lecture is relevant.

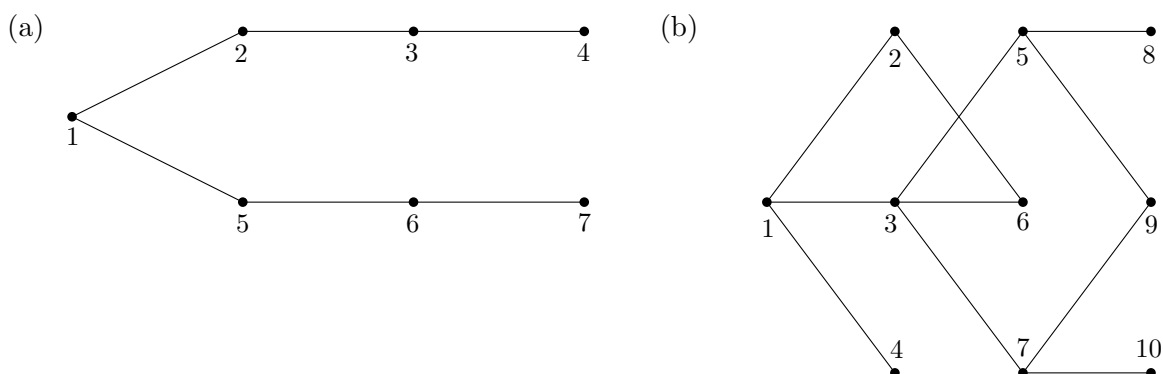
Exercise 1: Graph Representations

Give the following graphs as *adjacency array* and *adjacency list*.



Exercise 2: Breadth First (BFS) and Depth First Search (DFS)

For the following graphs, give the order in which nodes are visited (marked) when running BFS and DFS. Moreover, mark the resulting spanning trees in the respective graph. Start with the node with identifier 1. Whenever there is a choice, mark the node with smallest identifier first.



Exercise 3: Check for Cycles

- (a) Let $G = (V, E)$ be an undirected graph represented by an *adjacency list*. Describe an algorithm that tests in $\mathcal{O}(|V|)$ steps whether G has a cycle.
- (b) Argue why your algorithm is correct and has the desired running time.