

COMP3711: Design and Analysis of Algorithms

Tutorial 10

HKUST

Question 1

A string of parentheses is said to be balanced if the left- and right-parentheses in the string can be paired off properly. For example, the strings $()()$ and $()()$ are both balanced, while the string $((()))()$ is not. Given a string S of length n consisting of parentheses, design an algorithm to find the longest subsequence of S that is balanced.

Question 2

Let $G = (V, E)$ be an undirected graph where V is the set of vertices and E is the set of edges.

- a) What is the maximum number of edges in G ?
- b) What is the maximum number of edges in G if two vertices has degree 0.
- c) What is the maximum number of edges in G if G is acyclic?
- d) What is the minimum number of edges in G if G is connected graph and contain at least one cycle?
- e) What is the minimum degree among all vertices in G if G is connected graph?
- f) What is the maximum length of any simple path in G ?

Question 3

The adjacency list representation of a graph G , which has 7 vertices and 10 edges, is:

$a \rightarrow d, e, b, g$

$b \rightarrow e, c, a$

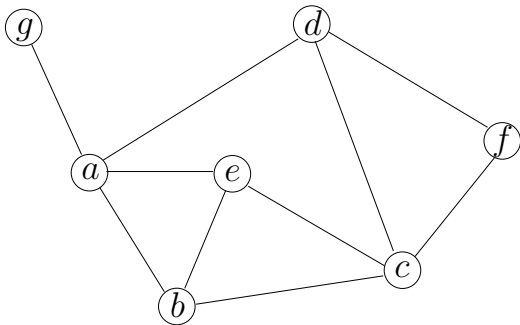
$c \rightarrow f, e, b, d$

$d \rightarrow c, a, f$

$e \rightarrow a, c, b$

$f \rightarrow d, c$

$g \rightarrow a$



Question 3

- (a) Show the breadth-first search tree by running BFS on graph G with the given adjacency list, use vertex a as the source.
- (b) Show the edges which are not presented in the BFS tree in part (a) by dashed lines.
- (c) Show the depth-first search tree by running DFS on graph G with the given adjacency list, use vertex a as the source.
- (d) Show the edges which are not presented in the DFS tree in part (c) by dashed lines.