

Comp 4433 Assignment 3

Each student is required to do this assignment individually and to hand in the answer sheet through D2L on the due date. You may use Microsoft Word or other software to type out your answer. The solutions should be neat and easy to read.

The score of the assignment will depend on:

Specification and documentation: 20 %

Correctness: 80 %

Late assignments will be penalized (-10% with 1-day delay; -20% with 2-day delay and -30% with 3-day delay) and will not be accepted after 3 days.

Problem 1.

1(a). What is an optimal Huffman code for the following set of frequencies, based on the first 8 Fibonacci numbers?

a:1 b:1 c:2 d:3 e:5 f:8 g:13 h:21

1(b). Generalize your answer to find the optimal code when the frequencies are the first n Fibonacci numbers.

Problem 2.

Suppose that we have a set of activities to schedule among a large number of lecture halls, where any activity can take place in any lecture hall. We wish to schedule all the activities using as few lecture halls as possible.

1. Give an efficient greedy algorithm (write pseudocodes) to determine which activity should use which lecture hall.
2. Explain why the schedule from your algorithm uses as few halls as possible.

Problem 3.

The transpose of a directed graph $G = (V, E)$ is the graph $G^T = (V, E^T)$, where $E^T = \{(v, u) \in V \times V : (u, v) \in E\}$. Thus G^T is G with all its edges reversed.

1. Describe efficient algorithms and give pseudocodes for computing G^T from G for both the adjacency list and adjacency matrix representations of G .
2. Analyze the running times of your algorithms.