Design and Analysis of Algorithms (COMP3001)

Tutorial 7
Data Compression

Question 1.

a)   Construct the Huffman code tree for the frequency distribution P ={1, 6, 8, 1, 6, 1}.

b)   What is the cost of this Huffman code in bits per symbol?

c)   How does this compare with the entropy of P?

d)   How does this compare with the cost of an alphabetic code (Hu-Tucker) on the same frequencies in the order they appear in P?

e)   Construct the Shannon-Fano code tree for the frequency distribution P = {1, 6, 8, 1, 6, 1}.

Question 2.

a)   Define the Fibonacci numbers.

b)   Construct a Huffman code tree for the first six Fibonacci numbers.

c)   What is the longest codeword length in a Huffman code generated on the first n Fibonacci numbers?

Question 3.

Construct the Hu-Tucker code tree for the frequency distribution P = {5, 2, 7, 2, 1, 1, 1, 2, 4, 5}.