Homework-3

Exercise# 2 (7.2, page 267)

2. Consider the problem of searching for genes in DNA sequences using Horspool's algorithm. A DNA sequence consists of a text on the alphabet {A, C, G, T} and the gene or gene segment is the pattern.

   a. Construct the shift table for the following gene segment of your chromosome 10:

   $$\text{TCCTATTCTT}$$

   b. Apply Horspool's algorithm to locate the above pattern in the following DNA sequence:

   $$\text{TTATAGATCTCGTATTCTTTTATAGATCTCCTATTCTT}$$

Exercise#1 (7.3, page 274)

1. For the input 30, 20, 56, 75, 31, 19 and hash function $h(K) = K \bmod 11$

   a. construct the open hash table.

   b. find the largest number of key comparisons in a successful search in this table.

   c. find the average number of key comparisons in a successful search in this table.

Exercise#2(8.3, page 297)

2. a. Write pseudocode of the bottom-up dynamic programming algorithm for the knapsack problem.

   b. Write pseudocode of the algorithm that finds the composition of an optimal subset from the table generated by the bottom-up dynamic programming algorithm for the knapsack problem.

Exercise#1 (8.4, page 311)

Apply Warshall's algorithm to find the transitive closure of the digraph
defined by the following adjacency matrix:

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Exercise#1.a (9.2, page 331)

1. Apply Kruskal's algorithm to find a minimum spanning tree of the follow-
   ing graphs.
   a.