

Homework #5

Due on Thursday, April 7 before class starts

1. a. Apply Horspool's algorithm to search for the pattern ROOM in the text
 WHO_KNEW_WHERE_IS_OUR_CLASSROOM
 How many comparisons you need for searching for the pattern in this example? You must show the shift table. (20 pts)
 b. For searching for a pattern of length m in a text of length n ($n \geq m$) with Horspool's algorithm, give an example of the **worst-case input** and the **best-case input**. (10 pts)

2. For the input 29, 13, 12, 84, 31, 27, 44, 62 and hash function $h(K) = K \bmod 8$
 - a. construct the open hash table. (10 pts)
 - b. find the **largest** number of key comparisons in a successful search in this table. (5 pts)
 - c. find the **average** number of key comparisons in a successful search in this table. (5 pts)

Hint: after constructing the open hash table, you can perform a search to find an input number in the given list. For c, you will assume the probability of a request of searching for any number in the given list is same.

3. Apply Warshall's algorithm to find the transitive closure of the digraph defined by the following adjacency matrix. (25 pts)

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

4. Use Floyd's algorithm to solve the all-pairs shortest path problem for the digraph with the following weight matrix. (25 pts)

$$\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 5 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 6 & \infty \\ \infty & \infty & 1 & 0 & 2 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$$