

CSC512 Computer Algorithms

First Semester 1427/1428 AH

Due:

Nov 27 at start of class

Instructor:

Dr. Aqil Azmi

Assignment #3

1. The string matching automaton searches for an exact match of pattern P in text T . We would like to introduce a new symbol into the pattern which means "match any single character." Let \diamond be this new symbol. If pattern $P = ba\diamond b$ and assuming that $\Sigma = \{a, b\}$ then P matches $baab$ and $babb$. **(a)** Construct $DFA(P)$ for $P = ba\diamond b$. **(b)** Run it on the text string $T = abbabaababb$.

2. Binary heaps are mostly stored sequentially, *i.e.* in an array. The way it is stored is as follows: root at position 1; the left and right child of node at position i are at $2i$ and $2i + 1$ respectively; while the parent of node at position i is at $\lfloor i/2 \rfloor$. For more details, see *Int. to Algorithms*, 2e, section: 6.1, pp. 127-8.

Suppose that we want to sequentially store a tree of degree 3 (each node has three children). Devise a formula so that for any node $a[i]$, $1 \leq i \leq n$, where would its parent and children would be? Also give a formula to find at which level the node $a[i]$ is at?