

## CS 302 Introduction to Data Structures

University of Nevada, Las Vegas

Spring 18

### Assignment 11

Due: Saturday, April 28, 2018, by email

1. Consider the array:  $|4|2|5|3|6|7|1|$ . Show the steps of Quicksort. (You may assume that the recursion ends when there are 4 elements).
2. Consider the array:  $|4|2|5|3|6|7|1|$ . Show the steps of Heapsort.
3. Consider the array:  $|8|4|2|5|3|6|7|1|$ . Show the steps of Mergesort.
4. (a) For the binomial tree  $B_k$  show that its height is  $k$  and there are exactly  $2^k$  nodes.  
(b) For the binomial tree  $B_k$  show that there are exactly  $\binom{k}{i}$  nodes at depth  $i$  for  $i = 0, \dots, k$ .
5. Show that
  - (a) The root of the binomial tree  $B_k$  has degree  $k$ .
  - (b) The maximum degree of any node in an  $N$ -node binomial tree is  $\log_2 N$ .
6. Using a separate chaining list table indexed  $0, \dots, 6$ , with  $\text{hash}(x) = x \bmod 7$ , insert the numbers  $1, \dots, 100$ . How many elements will be at index location 0?
7. Into a hash table with `TableSize` = 10, insert the following elements 10, 49, 39, 28, 19 in this order
  - (a) using linear probing,
  - (b) using quadratic probing.

**How to submit.** Create one PDF file with your solutions. Email this file as an attachment to the TA, Mr. Kaushik Deshmukh, [deshmk1@unlv.nevada.edu](mailto:deshmk1@unlv.nevada.edu). Subject of your email must be "Assignment 11", <your name>, <your student ID number>.