CS 421 Midterm2 Sample

1. Complete the following statements for a B-tree

* Height of all leaves in a B-tree ……………….
* If a node has **n>1** key values, it must have ………….. children
* If a B-tree has degree **t**, then each node except possibly root must have at least ………….. keys and at most ………….. keys
* Height of a B-tree with **n** keys and degree **t** is ………………

1. Let K={371, 223, 173, 199, 344, 504, 405, 989, 189, 26} be given key set. Using *Hopscotch* hashing method with *h(x)=x mod 10*, insert each key in K in given order into table T, where window size M=3.
2. What is the table size T? Why?
3. Construct the table T, list code-words of each key value. Clearly show how you obtain each code-word
4. a) Give an example of each: *almost complete* and *not almost complete* binary tree.
5. Construct *Binary heap* for the key set K={4, 7, 5, 7, 4, 6, 6, 3, 3, 4, 3, 2} by USING ALGORITHM GIVEN IN THE CLASS. Clearly list all **heapify** algorithm calls in order.
6. a) Suppose you construct a **binomial** heap with 11 key values. What are the binomial trees you must have in the heap? Why?
7. Construct *Binomial heap* for the following key set K={4, 7, 5, 7, 4, 6, 6, 3, 3, 4, 2}
8. Suppose **min**(A) algorithm *determines* the minimum key in a heap A.
9. What is the complexity of **min**(A) if A is an array? Why?
10. What is the complexity of **min**(A) if A is a binary tree? Why?
11. What is the complexity of **min**(A) if A is a queue? Why?
12. What is the complexity of **min**(A) if A is a binary heap? Why?
13. What is the complexity of **min**(A) if A is binomial heap? Why?
14. Master Theorem. If the following recurrence relation is given

Then solution of T(n) is

Find the solutions of the following recursive relations by using the formula above.