Math 382

Homework 4

Due Wednesday, March 11

1. Say that we have a hash table with 9 bins, and we use the hash function $h(k) = k \% 9$. Draw a representation of the table after the keys 5, 28, 19, 15, 20, 33, 12, 17, and 10 have been inserted into it (in that order). How long is the largest chain? How many of the elements have collisions?

2. Say we modified our hash table so that instead of new elements being stored at the head of the chain, they are inserted in the correct position to keep each chain sorted. How long does the new hash table take for searches (both successful and unsuccessful), insertions, and deletions? Are these times better or worse than the version of a hash table we discussed in class?

3. When using the multiplication method for hash functions, does .25 make for a good choice of A value? Why or why not?

4. Consider inserting the keys 10, 22, 31 4, 15, 28, 17, 88, and 59 into a hash table (in that order). Let the hash table have size $m = 11$ and use open addressing with the auxiliary hash function $h'(k) = k$. Illustrate the resulting hash table using linear probing, quadratic probing with $c_1 = 1$ and $c_2 = 3$, and double hashing with $h_1(k) = k$ and $h_2(k) = 1 + (k \% (m - 1))$.