CS340 Homework3 Hash Tables Name_____Stuart Lech_____

1. Demonstrate what happens when we insert the keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into a hash table with collisions resolved by chaining. Let the table have 9 slots and let the hash function be h(k) = k mod 9.

Slot	Value(s)
0	-
1	[10, 19, 28]
2	[20]
3	[12]
4	-
5	[5]
6	[15,33]
7	-
8	[17]

2. Think about trying to improve performance of a hash table using chaining by keeping each list in sorted order. How does this affectt the running time for successful searches, unsuccessful searches, insertions, and deletions? The unsorted time complexities are given, with n=total keys and m8=slots in hash table. For example, a successful search takes O(n/2m) time, because the linked list at each slot has an average length of n/m items, and the typical search will find the key halfway through the list.

Operation	With Unsorted Linked List	Expected time with Sorted Linked List
Insertion	O(1)	O(log(n/m))
Successful search	n/2m	(Log(n/m) / 2)
Unsuccessful Search	n/m	(Log(n/m))
Deletion	Same as search	Same as search

3. Consider a hash table of size 7 with hash function: h(k)= k mod 7. Insert in order 19, 26,13, 48,17. What is result when collisions are handled by linear probing?

0	1	2	3	4	5	6
13	48	-	17	-	19	26

4. Consider a hash table of size 7 with hash function: h(k)= k mod 7. Insert in order 19, 26,13, 48,17 when collisions are handled by double hashing where the second has function is h'(k) = 5 – (k mod 5).

0	1	2	3	4	5	6
-	48	26	17	-	19	13