CSC 212 -Data Structures

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Hashing in-class exercises

Exercise 1

Consider a hash table of size 13, and assume open addressing with linear probing

a. **Show what the hash table will look like after the following items are added in the order shown.**
26 54 77 90 27 30 28 52 96 65

26	90	54	27	30	28	52	96	65				77
0	1	2	3	4	5	6	7	8	9	10	11	12

b. **What's the load factor of the hash table after the values above are added?**

10/13

c. **If any of the values cause a collision, indicate which.**

90, 28, 52, 65

d. **How many comparisons are needed to find 65 in the table? Briefly explain.**

9 comparisons are required to reach the open dressed value of 65, as it's hashed slot is [0] but was placed at [8].

e. **How many comparisons are needed to determine that 104 is not in the table? Briefly explain.**

10 comparisons; sequential search would end at an empty slot.

f. **What's the hash value computed for the string "dog"? Show your work.**

ord('d') => 100, ('o') => 111, ('g') => 103

100 + 111 + 103 = 314

314 % 13 = 2

Exercise 2

Suppose chaining is used as the method for collision resolution.

Part A

a. **Show what the hash table will look like after the following items are added in the order shown.**

26 54 77 90 27 30 28 52 96 65

0	1	2	3	4	5	6	7	8	9	10	11	12
26	27	54		30	96							77
52	28											90
65												

b. **How many comparisons are needed to find 65 in the table?**

3

c. **How many comparisons are needed to determine that 104 is not in the table? Briefly explain.**

3

It would compare only the hashed index, that being [0], and the two other values within that slot.

Exercise 3

a. **Consider a hash table with a load factor of 0.8. What's the average number of comparisons for a successful search assuming open addressing with linear probing?**

3

b. **What's the average number of comparisons for a unsuccessful search given the same assumptions?**

13

$\frac{1}{2}\left(1+\frac{1}{1-0.8}\right)$

$\frac{1}{2}\left(1+\frac{1}{0.2}\right)$

$\frac{1}{2}(1+5)$

$\frac{1}{2}(6)$

3

$\frac{1}{2}\left(1+\left(\frac{1}{1-0.8}\right)^2\right)$

$\frac{1}{2}\left(1+(5)^2\right)$

$\frac{1}{2}(1+25)$

$\frac{1}{2}(26)$

13