Student Information

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Due Date: 8 Nov 2018, 11:59pm.
Submit answers on eDimension in pdf format. Submission without student information will **NOT** be marked! Any questions regarding the homework can be directed to the TA through email (contact information on eDimension).

Week 6

Question 1

1. Consider a hash table of size $m = \sqrt{n}$. Then under the uniform hashing assumption, as $n \to \infty$, the number of empty slots tends to:

a) a constant

b) zero

c) infinity

2. If $m = cn; c > 0$ then as $n \to \infty$, the number of empty slots tends to:

a) a constant

b) zero

c) infinity

3. If $m = n^a; a > 1$ then as $n \to \infty$, the number of empty slots tends to:

a) a constant

b) zero

c) infinity

Question 2

Consider a hash table of size 1000, and $n = 1500$ keys to be hashed uniformly.

1. The expected number of empty slots is about:

a) 150

b) 220

c) 350

2. The expected number of collisions is about:

a) 100

b) 230

c) 720

3. For a random slot, the average number of keys that hash on that slot is:

a) 0.5

b) 2

c) 1.5

Question 3

1. If the loading factor is greater 1, we expect:

a) all slots to have at least one item

b) most slots to have at least one item

c) it can never happen that more than half of the slots are empty

2. If the loading factor is smaller 1, we expect:

a) most slots to be empty

b) very few slots to have one or more items

c) very few slots to have two or more items

Question 4

Given the following adjacency lists:

adj(s) = [a, c, d],
adj(a) = [ ],
adj(c) = [e, b],
adj(b) = [d],
adj(d) = [c],
adj(e) = [s].

1. Starting with node s, list the visited node order for:

a) Breadth First Search s, a, c, d, e, b

b) Depth First Search s, a, c, e, b, d

2. The adjacency list representation is better in terms of space than the matrix representation for graphs that are not dense (i.e., the number of edges $m = O(n)$, where n is the number of nodes) because ___b___

a) it is simpler to represent the edges from each node as a linked list

b) an adjacency matrix representation does not explicitly name the set of edges

c) when the graph is not dense, the number of edges is $m = O(n)$ and the space complexity in bits when using the adjacency list representation is $O(n \log n)$ instead of $O(n^2)$

d) for non-dense graphs both representations are equivalent since the complexity is proportional to the number of nodes