CST 370 Design and Analysis of Algorithms
Spring 2020
Quiz 6

Name: _____

Four-digits ID: _____

"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Signature _____

- Do not start until told to do so.
- Look over all the questions and observe their point values before you start.
- Use your time wisely—make sure to answer the questions you know first.
- **Read the questions carefully.**

1. (3 points) Assume that you construct a hash table using the **separate chaining** for the following 7 keys:

31, 72, 20, 14, 9, 2, 32

Assume also that the hash function is ***h(K) = K mod 5***. For the problem, **do not consider the rehashing**.

(a) After constructing the hash table with the keys, **present all indexes** in the table which **do not have any collisions**, if they exist. If there's no index without collision, write it clearly.

_____

(b) For the hash table constructed above, assume that you want to insert a new key **17**. Is there any collision for the key "**17**"? (Yes / No).

(c) For the hash table after inserting "17" in the problem (b), assume that you want to insert a new key **18**. Is there any collision for the key "**18**"? (Yes / No).

2. (3 points) Assume that you conduct the **linear probing** with the hash function ***h(K) = K mod 5***. This is the initial hash table for the problem. Note that the status '**E**' indicates "**Empty**".

Index	Content	Status
0		E
1		E
2		E
3		E
4		E

Assume that you will conduct the following three operations

1) **insert 52**
2) **insert 47**
3) **delete 52**

Update the hash table below after the three operations. For the status, use "E" for "Empty", "A" for "Active", and "D" for "Deleted".

Index	Content	Status
0		
1		
2		
3		
4		

3. (3 points) Apply the dynamic programming technique to solve the **coin-row problem** with the coins **6, 2, 3, 1, 4, 5**.

(a) **Fill out the table** as you learned in the class.

index	0	1	2	3	4	5	6
$\mathbf{c_i}$							
F(i)							

(b) **Present which coin(s) you will pick** based on the result.

_____