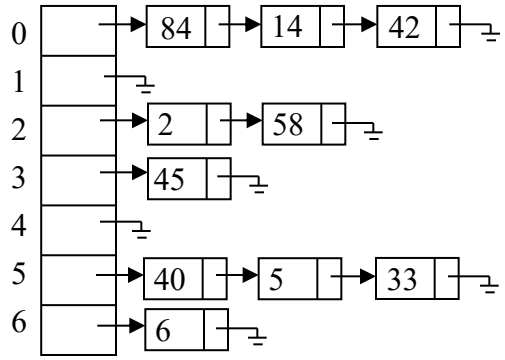
Washington State University
School of Electrical Engineering and Computer Science
Spring 2022

CptS 223 Advanced Data Structures in C++
Homework 7 – Solution
Due: March 9, 2022 (11:59pm pacific time)

For each of the different hash tables described below, show the final hash table after inserting the keys 42, 33, 45, 5, 14, 58, 84, 6, 2, 40 (in this order) into an initially empty table with no rehashing. *Note: Your solutions should match the result from using the code in the textbook, which may be different from the results obtained by web apps or other implementations.*

1. A hash table of size *M=7* using collision-resolution by chaining and the hash function *hash(x) = x mod M*. Your table should look similar to the one in Figure 5.5 of the textbook.

   Solution:



2. A hash table of size *M=11* using collision-resolution by open-addressing and the linear probing hash function $h_i(x) = (hash(x) + f(i)) \bmod M$, where *hash(x) = x mod M*, and *f(i) = i*. Your table should look similar to the one in Figure 5.19 of the textbook.

   Solution:

0	33
1	45
2	2
3	14
4	58
5	5
6	6
7	84
8	40
9	42
10	

3. A hash table of size $M=11$ using collision-resolution by open-addressing and the quadratic probing hash function $h_i(x) = (hash(x) + f(i)) \bmod M$, where $hash(x) = x \bmod M$, and $f(i) = i^2$. Your table should look similar to the one in Figure 5.19 of the textbook.

   Solution:

0	33
1	45
2	2
3	14
4	58
5	5
6	6
7	84
8	40
9	42
10	

4. A hash table of size $M=11$ using collision-resolution by open-addressing and the double hashing function $h_i(x) = (hash(x) + f(i)) \bmod M$, where $hash(x) = x \bmod M$, and $f(i) = i * hash_2(x)$, and $hash_2(x) = R - (x \bmod R)$, where $R = 7$. Your table should look similar to the one in Figure 5.19 of the textbook.

   Solution:

0	33
1	45
2	2
3	14
4	40
5	5
6	6
7	84
8	58
9	42
10	