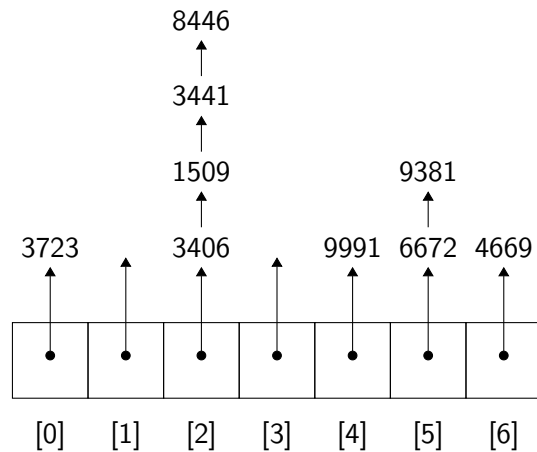


CS 310
Assignment 1030
30 October 2020

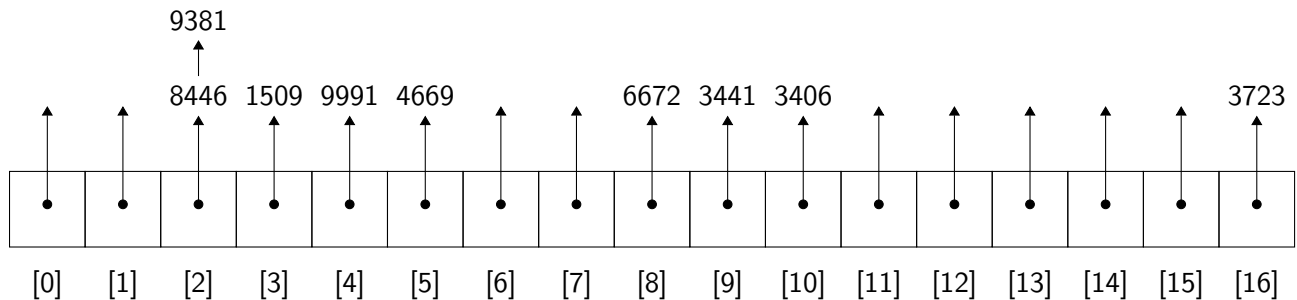
Bill Jin

Problem 1 — Given the input 3406, 6672, 4669, 1509, 8446, 9991, 3723, 9381, and 3441, in that order, and the hash function $h(x) = 6 - (x \bmod 7)$, draw the resulting hash table. State and explain any assumptions you make.

Answer: Since hash the module number is 7, therefore the size of the array will be 7 starting from index 0, also it is a prime number. There is no number hashed into index 1 and 3, so there is empty place.



Problem 2 — Based on the first question, we could find out there are 3 collisions, which is too many on index 2. So the table should be rehashed into another table whose size is a prime number and more than twice the original size. Thus, the size should be 17, which is twice more than 7 and is a prime number. And the hash function is $h(key) = 16 - (key \bmod 17)$, which resulted the table as follows. From the result follows, there are only 1 collision happened on index 2 and only 52.9% of the entries are occupied.



Problem 3 — See the submitted file.

Problem 4 — *Answer:* Based on my code, the table size I chose is 102407. Which is the nearest and the prime number greater than 102401-the number of the words in the words file. The result I got is 37607 collisions. And the load factor is $\frac{102401}{102407} \approx 0.9999414$, which is most approximately equal to 1. The closer load factor approach to 1, the better performance the code could be.