HASHING

Problem 1.

Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \bmod 10$, show the resulting

   a. separate chaining hash table
   b. hash table using linear probing
   c. hash table using quadratic probing
   d. hash table with second hash function $h2(x) = 7 - (x \bmod 7)$

Problem 2.

Show the result of rehashing the hash tables in Problem 1.

Problem 3.

What is the minimum number of keys that are hashed to their home positions using the linear probing technique? Show an example using a 5-cell array.

Problem 4.

Is there any advantage to using binary search trees instead of linked lists in the separate chaining method?

Problem 5.

A large number of deletions in a separate chaining hash table can cause the table to be fairly empty, which wastes space. In this case, we can rehash to a table half as large. Assume that we rehash to a larger table when there are twice as many elements as the table size. How empty should the table be before we rehash to a smaller table?

Problem 6.

What are the advantages and disadvantages of the various collision resolution strategies?

Problem 7.

Implement a dictionary that supports the insert and lookup operations. The implementation will store a hash table of pairs (key, definition). You will lookup a definition by providing a key.