Problem 1
(Adapted from Weiss 5.1)

Given input \{4371, 1323, 6173, 4199, 4344, 9679, 1989\} and a hash function \(h(x) = x \mod 10\), show the resulting hash tables of size 10 with bins 0 through 9:

A Separate chaining hash table (remember to add items to the beginning of lists).

B Hash table using linear probing.

C Hash table using quadratic probing.

D Hash table with a second hash function \(h_2(x) = 7 - (x \mod 7)\).

Problem 2

In this problem you will practice insertion and deletion in binary heaps (default min heap).

A Show how to insert 10, 12, 1, 14, 6, 5, 8, 15, 3, 9, 7, 4, 11, 13, and 2 into an initially empty binary heap. Insert each value, one at a time (not with buildHeap), and show each of the 15 steps as separate trees (pictorially with nodes and edges).

B Show the results of two consecutive \texttt{deleteMin} operations on the heap above (show each).
Problem 3

(Adapted from Weiss 6.32)
Merge these two binomial queues:

Figure 6.59

Problem 4

(Adapted from Weiss 8.1)
Show the results of the following sequence of instructions:

union(1,2), union(3,4), union(3,5), union(1,7),
union(3,6), union(8,9), union(1,8), union(3,10),
union(3,11), union(3,12), union(3,13), union(14,15),
union(16,0), union(14,16), union(1,3), union(1,14)
when unions are:

A Performed arbitrarily.

B Performed by height.

C Performed by size.