

- 5.1 Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \bmod 10$, show the resulting:
- Separate chaining hash table.
 - Hash table using linear probing.
 - Hash table using quadratic probing.

A.

1: 4371
 3: 1323 → 6173
 4: 4344
 9: 4199 → 9679 → 1989

B.

0: 9679
 1: 4371
 2: 1989
 3: 1323
 4: 6173
 5: 4344
 :
 9: 4199

C.

0: 9679
 1: 4371
 :
 3: 1323
 4: 6173
 5: 4344
 :
 8: 1989
 9: 4199

- 5.1 Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \bmod 10$, show the resulting:
- Separate chaining hash table.
 - Hash table using linear probing.
 - Hash table using quadratic probing.
 - Hash table with second hash function $h_2(x) = 7 - (x \bmod 7)$.

- 5.2 Show the result of rehashing the hash tables in Exercise 5.1. *table size = 23.*

$$h_1(x) = x \bmod 23$$

A.

```

1: 4371
9: 6173
11: 1989
12: 1323
13: 4199
19: 9679
20: 4344
  
```

B.

```

1: 4371
9: 6173
11: 1989
12: 1323
13: 4199
19: 9679
20: 4344
  
```

C.

```

1: 4371
9: 6173
11: 1989
12: 1323
13: 4199
19: 9679
20: 4344
  
```

*the results of A, B, C are the same,
because there is no collision.*

- 6.2 a. Show the result of inserting 10, 12, 1, 14, 6, 5, 8, 15, 3, 9, 7, 4, 11, 13, and 2, one at a time, into an initially empty binary heap.
 b. Show the result of using the linear-time algorithm to build a binary heap using the same input.

A.

- INF, 10
 - INF, 10, 12
 - INF, 1, 12, 10
 - INF, 1, 12, 10, 14
 - INF, 1, 6, 10, 14, 12
 - INF, 1, 6, 5, 14, 12, 10
 - INF, 1, 6, 5, 14, 12, 10, 8
 - INF, 1, 6, 5, 14, 12, 10, 8, 15
 - INF, 1, 3, 5, 6, 12, 10, 8, 15, 14
 - INF, 1, 3, 5, 6, 9, 10, 8, 15, 14, 12
 - INF, 1, 3, 5, 6, 7, 10, 8, 15, 14, 12, 9
 - INF, 1, 3, 4, 6, 7, 5, 8, 15, 14, 12, 9, 10
 - INF, 1, 3, 4, 6, 7, 5, 8, 15, 14, 12, 9, 10, 11
 - INF, 1, 3, 4, 6, 7, 5, 8, 15, 14, 12, 9, 10, 11, 13
 - INF, 1, 3, 2, 6, 7, 5, 4, 15, 14, 12, 9, 10, 11, 13, 8

B.

Initial build: 10, 12, 1, 14, 6, 5, 8, 15, 3, 9, 7, 4, 11, 13, 2
 Heap bottom level: 10, 12, 1, 3, 6, 4, 2, 15, 14, 9, 7, 5, 11, 13, 8
 Heap next level up: 10, 3, 1, 12, 6, 4, 2, 15, 14, 9, 7, 5, 11, 13, 8
 Final heap: 1, 3, 2, 12, 6, 4, 8, 15, 14, 9, 7, 5, 11, 13, 10