CSCI 3333 Homework: Hash Tables
(with Solutions)

1 Chaining

For Problems [2] and [3] assume that insertion into a linked list occurs at the tail, the hash function used is \( h(i) = i \mod l \), and that initially \( l = 4 \).

**Problem 1.** What is the load factor of the hash table seen in Figure 1?

![Figure 1: The hash table in Problem 1](image1)

**Solution 1.** \( \frac{8}{6} \approx 133\% \).

**Problem 2.** Draw the chaining hash table that results from inserting the following elements: 3, 8, 2, 7, 40, 44, 50.

**Solution 2.** *See Figure 2*

![Figure 2: The solution to Problem 2](image2)

**Problem 3.** Draw the chaining hash table that results from the following operations: `insert(5)`, `insert(9)`, `erase(5)`, `insert(20)`, `insert(22)`, `insert(30)`, `erase(9)`, `erase(22)`, `erase(30)`, `insert(40)`, `insert(50)`.

**Solution 3.** *See Figure 3*
2 Linear Probing

For Problems 5 and 6, assume that the hash function used is $h(i) = (i + 1) \mod l$, and that initially $l = 4$.

**Problem 4.** What is the load factor of the hash table seen in Figure 4?

![Figure 4: The hash table in Problem 4.](image)

**Solution 4.** $\frac{6}{12} = 50\%$.

**Problem 5.** Draw the linear probing hash table that results from inserting the following elements: 3, 7, 11, 19, 40, 44, 50.

**Solution 5.** See Figure 5.

![Figure 5: The solution to Problem 5.](image)

**Problem 6.** Draw the linear probing hash table that results from the following operations: insert(5), insert(9), erase(5), insert(20), insert(22), erase(1), erase(22), insert(30), insert(40), insert(50), insert(66).

**Solution 6.** TBD.