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?

\[ \frac{8}{6} \approx 133\% \]

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.

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 \( l = 3 \).

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

\[
\begin{array}{ccccccc}
7 & 5 & \boxed{3} & 9 & 0 & 4 & \boxed{1}\n\end{array}
\]

Figure 4: The hash table in Problem 4

**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

**Problem 6.** Draw the linear probing hash table that results from the following operations: \text{insert(5), insert(9), erase(5), insert(20), insert(22), erase(9), erase(22), insert(30), insert(32), insert(50), erase(20)}.

**Solution 6.** *See Figure 6*
Figure 6: The solution to Problem 6.