

## Program 3 Test Plan

**Develop the test plan:** *For each member function that you plan to write, think about how to test it – what flow of control exists in the member function and how would you test out all conditions:*

Test Case(s)	Expected Result	Verified? (yes/no)
<b>Hash_table:</b>		
<b><i>Insert:</i></b>		
Inserting a single item on an empty hash table	The head node at the hashed index contains the item	<b>Yes</b>
Inserting multiple items with the same Search key	Each item is pushed to the front of the same chain at the hashed index	<b>Yes</b>
Inserting multiple items with different search keys	Each item is pushed to the front of different chains	<b>Yes</b>
Inserting multiple items when the load factor is greater than 1	Each item inserted get pushed to the front of a chain at the hashed index	<b>Yes</b>
<b><i>Erase:</i></b>		
Erase with a non-matching search key	Returns false, hash table is unchanged	<b>Yes</b>
Erase with a matching search key	Returns true, item matching the search key is deleted. Hash node carrying item is set to NULL	<b>Yes</b>
<b><i>Find:</i></b>		
Find with a non-matching search key	Returns the default object	<b>Yes</b>
Find with a matching search key	Returns a reference to the matched object	<b>Yes</b>
<b><i>Clear:</i></b>		
On an empty table	Nothing, hash table is unchanged	<b>Yes</b>
On a populated table	Each chain is recursively deleted Size data member is updated to 0	<b>Yes</b>

<b><i>Size:</i></b>		
On an empty table	Returns 0	<b>Yes</b>
On a hash table with 'N' elements	Returns N	<b>Yes</b>
<b><i>Empty:</i></b>		
On an empty hash table	Returns true	<b>Yes</b>
On a populated hash table	Returns false	<b>Yes</b>
<b><i>Begin:</i></b>		
On an empty hash table	Returns a NULL iterator	<b>Yes</b>
On a populated hash table	Returns an iterator to the first element on the table, not necessarily the first element inserted	<b>Yes</b>
Incrementing a begin iterator	Iterator travels down the chain until NULL, then finds the next valid chain. If no more chains are found the iterator becomes NULL	<b>Yes</b>
<b><i>End:</i></b>		
On an empty/populated hash table	Returns a NULL iterator	<b>Yes</b>
<b>Item_table:</b>		
Item_tables add, remove, and get item methods are wrappers for the hash_tables insert, erase, and find functions. The unit tests for those functions have already been outlined above		
<b><i>Display_all:</i></b>		
On an empty table	Displays nothing	<b>Yes</b>
On a populated table	Displays each item object to the console	<b>Yes</b>

**Verify correctness:** Using the above test plan, create a test program that tests the interactions of all functions together.