

Assignment 3

1. Exercise [11.2-3 on p. 229] Modify hashing by chaining (i.e., bucketVector with BucketType = List) so that BucketType = OrderedList. How is the runtime of search, insert, and remove affected?
2. Exercise [11.2-5 on p. 229] Assume hashing by chaining as above (and as in fsu:THashTable<>). Denote by U the “universe” of keys. (This can be the set of all objects of the data type stored in the table, or some subset of that constrained by the particular use of the table.) Show that if $|U| \geq km$, where m is the number of buckets, then there is a subset of U of size k consisting of keys that all hash to the same bucket. (Note that k is just an integer, not the size of anything.)
3. For the following binary tree, complete the table showing each step in a traversal and the number of edges covered by each step (begin, next, ... , next):

Q	iteration step	current location	no of edge moves
/ \	-----	-----	-----
/ \	1. initialize		
W E	2. ++		
\ / \	3. ++		
R T Y	...		
	7. ++	(null)	

4. Describe an order in which vertices of a BST can be saved to ensure that reconstructing a BST from the saved data will result in the same tree. Argue correctness of your assertion.
5. Use the result of Assignment 1 Problem 3(e) [problem 4-5(e) in the textbook] to prove: Height-balanced binary trees satisfy $height(n) = \Theta(\log n)$, where n = number of vertices in the tree.