

Data Structures

Prof. Loftin: Practice Test Problems for the Material after Test 2

1. Consider the following array of integers:

13 5 30 12 15 4 10 6 0

- (a) Trace through the above array using selection sort.
 - (b) Trace through the above array using insertion sort.
 - (c) Trace through the above array using bubble sort.
 - (d) Trace through the above array using mergesort.
 - (e) Trace through the above array using quicksort (with the first element as the pivot).
 - (f) Trace through the above array using radix sort (in particular, the data should all be 2-digit numbers for radix sort to work. How should this be achieved?)
 - (g) Place the elements of this array, in order provided, into an initially empty binary search tree.
2. True/False: Performing mergesort on an array of n elements always takes $O(n * \log_2 n)$ steps.
 3. If an array of n elements is already sorted in ascending order, how many steps (in terms of O notation) does bubble sort take? Answer the same question for selection sort, mergesort and quicksort.
 4. Consider the following array of letters:

A X Z C V P N O Q E B

- (a) In the order provided, place the elements of this array into an initially empty binary search tree.
- (b) For the tree in part (a), what is the result of a preorder traversal?
- (c) For the tree in part (a), what is the result of a postorder traversal?

5. Write the code for a method

```
public void bubblesort (Comparable[] ar)
```

which uses bubble sort to sort the array `ar`.

6. Consider a class `BinaryTree` which has as data

```
private TreeNode<E> root;
```

From inside this class, write a method

```
public void printPostorder()
```

which prints to the screen the results of a postorder traversal of the tree. (Assume the `TreeNode` class has the usual methods `getLeft()` and `getRight()` to access the left and right child nodes.) You may also write any auxiliary methods as you see fit.