Solutions to Quick Check Questions

11

Sorting and Searching

11.1 Searching

1. Suppose an array contains 2048 elements. What are the least and the most numbers of comparisons for a successful search using linear search?

   Minimum = 1
   Maximum = 2048

2. Repeat the previous question with binary search.

   Minimum = 1
   Maximum = 10

11.2 Sorting

1. Show the result of the second pass of bubble sort applied to the array at the bottom of Figure 11.7.

| 0	1	2	3	4	5	6	7	8
5	17	12	23	38	44	77	84	90

Although the minimum guaranteed result is the movement of 84 to position 7, many exchanges have occurred during the second pass causing multiple elements to move toward their final positions. In fact, you need only one more pass to sort the whole array.

2. For an array with *N* elements, what is the least number of comparisons the bubble sort will execute?

The minimum number of comparisons is N-1. When the array is already sorted, the bubblesort will go through one pass, making N-1 comparisons. At the end of the pass, the boolean variable exchanged remains false, causing the whole routine to terminate.
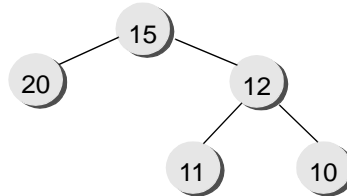
11.3 Heapsort

1. The following structure violates the value relationship constraints. Use the contruction phase routine of the heapsort to eliminate the violations.

Answer:

```
              40
         20        22
      10    15   12    18
```
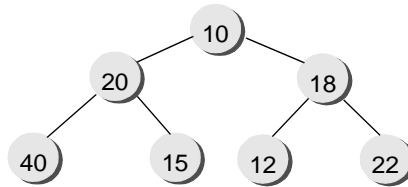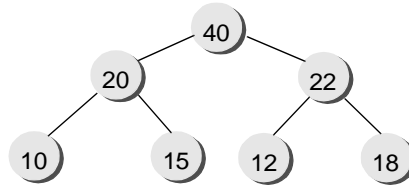
2. Identify all violations on structural and value relationship constraints in the following structure:

```
              15
         20        12
                11    10
```

Violation 1: Structural - Nodes 11 and 10 should come under node 20 to be a valid heap.

Violation 2: Value Relationship - Node 15 is not larger than node 20.

11.4   Sample Program: Sorting an AddressBook

No Quick Check Questions.