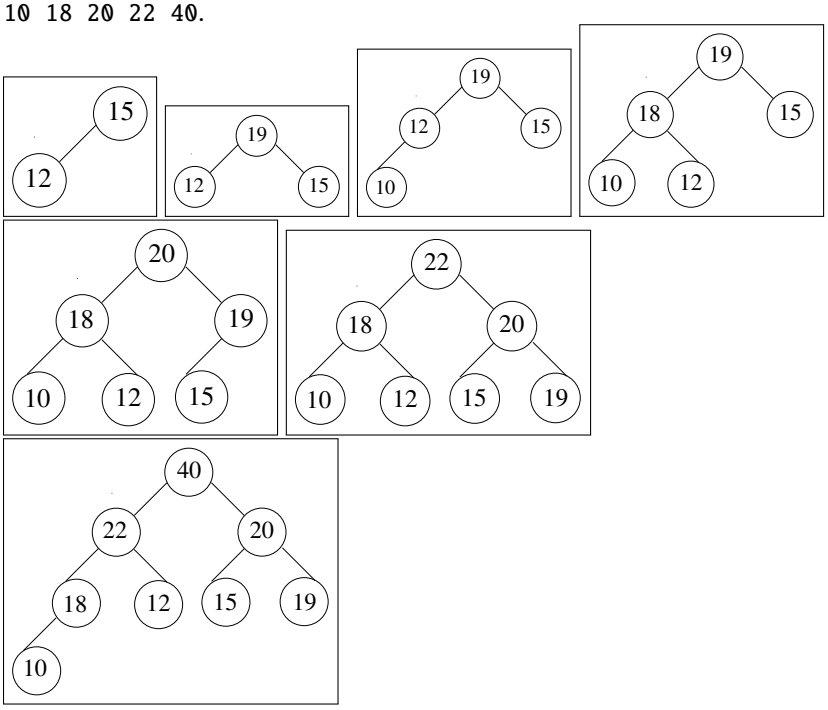
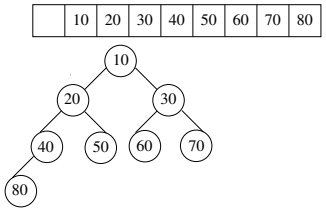
FIT1008 – Intro to Computer Science
Solutions for Additional Exercise
Semester 2, 2016

Exercise 1

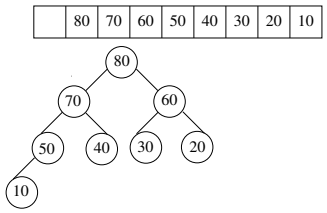
The following figures show the growth of the heap (in binary tree format) from 2 elements onwards, when adding elements `15 12 19 10 18 20 22 40`.



Exercise 2



The array 10,20,30,40,50,60,70,80, where element 10 is at index 1, 20 at index 2, etc, is not a max-heap. As it is easy to see in the left figure, the array does represent a complete binary tree. However, 10 (which is the root element according to the array) is not greater than either of its two children (20 and 30). The array represents a min-heap.



The array 80,70,60,50,40,30,20,10, where element 80 is at index 1,70 at index 2, etc, is indeed a max-heap. As always, the array does represent a complete binary tree (as shown in the right figure). Furthermore, note that every node is greater or equal (in this case always greater) than its two children, if any.

Exercise 3

Heap sort is not stable. Consider an array where all the elements are the same value. The heapification step will do nothing; then the retrieval step will move the root value to the bottom and leave it there. The array will end up in reverse (relative) order.