1. Show that an $n$ element binary heap has height $\lfloor \log_2 n \rfloor$.

2. Where in a max-heap might the smallest element reside, assuming that all elements are distinct?

3. Is an array in sorted order a min-heap?

4. Write an efficient MAX-HEAPIFY (in pseudocode) that uses iteration instead of recursion.

5. Why does the loop index in BUILD-MAX-HEAP need to decrease instead of increase?

6. What is the running time of Heapsort on an array that is already sorted? What is the running time on an array that is in reverse order?

7. Add an implementation of Heapsort to the sorting program that you wrote for Homework 2. (A heap should, of course, be implemented as a class.) Plot its running time for a variety of input sizes and compare this to the running time of the other 4 sorting algorithms.