In-class exercises: Heaps

1. What are the minimum and maximum number of elements in a heap of height h? Note: the height of a heap is the number of edges on the longest root-to-leaf path.
2. Where in a min-heap might the largest element reside, assuming that all elements are distinct?
3. Is an array that is in sorted order a min-heap?
4. What is the effect of calling MIN-HEAPIFY(A, i) for $i > size[A]/2$?

GT C-2.31 Develop an algorithm that computes the kth smallest element in a set of n distinct integers in $O(n + k \lg n)$ time.