Extra Practice Problems for Quiz 1

This set of problems is to help you practice for Quiz 1 and is not to be turned in.

Problem 2-1. Lower Bounds in the Comparison Model
Do the problems 8.1-1 and 8.1-3 from CLRS.

Problem 2-2. Bounded Integers
Do the problem 8.2-4 from CLRS.

Problem 2-3. Stable Sorting
Do the problem 8.3-2 from CLRS.

Problem 2-4. Priority Queue Implementation
In this problem, we will implement some of the other operations on heaps: INSERT, DELETE, and INCREASE. (Together with the operations from the class, they will make up a priority queue implementation.)

(a) Implement the procedure \textsc{Insert}(Q, x) that inserts an element \( x \) into the heap \( Q \).

(b) Implement the procedure \textsc{Delete}(Q, i) that deletes the element at position \( i \) from the heap \( Q \). (Note that the procedure takes as a parameter the pointer \( i \) to the deleted element; otherwise, it would take \( \Omega(n) \) time just to find the element in the heap.)

(c) Implement the procedure \textsc{Increase}(Q, i, k) that increases the value of the element at position \( i \) from the heap \( Q \) to a new value, \( k \), which is assumed to have a higher value.