Quiz #1

Name:

READ THE QUESTIONS CAREFULLY!!! DO NOT WASTE TIME DOING MORE THAN IS ASKED FOR. DO NOT IMPLEMENT METHODS UNLESS SPECIFICIALLY REQUESTED. YOU DO NOT NEED TO COMMENT THE CODE.

1. Write an **interface** `cop3530.MedianHeap` with the public methods below. (This is a different interface than what you wrote for program 1, but the principles are identical.) You do not need to know what a `MedianHeap` is; for the purpose of this quiz, it is simply the name of the interface and it will have the following functionality:

   - Three accessors: One returns the Kth smallest item (K is a parameter of the method); the second tests if the `MedianHeap` is empty; the third, `getSize`, returns the number of elements currently stored in the `MedianHeap` container.
   - Three mutators: One makes the `MedianHeap` empty; another returns and removes the Kth smallest item (K is a parameter of the method); and one inserts a new item.

2. Provide a class `cop3530.ArrayMedianHeap` that implements the `MedianHeap` interface. Represent the `ArrayMedianHeap` internally as a (sorted) `Object[]`, a `currentSize` data member, and a `Comparator`. After listing the data fields, you may use `...` to indicate the rest of the body of this class, except for the following which must be implemented:

   (a) Implement a constructor that takes a `Comparator` as a parameter. You do not need to implement a zero-parameter constructor for this quiz.

   (b) Implement the routine that finds and removes the Kth smallest item. Note that if K is 1, then you are finding the smallest item (which is stored in position 0); if K is 2, then you are finding the second smallest item (which is stored in position 1), etc. Throw an `IllegalArgumentException` if K is invalid.