Bonus Question

The bonus question is worth 10% of the final exam. That is, the maximum total mark of the final exam is 110%.

Question

A heap is conceptually a binary tree. Your task is to implement heaps **using linked structures** instead of arrays.

- Complete the methods of heaps in file BinaryHeap.java. Submit only file BinaryHeap.java.
- You can write your own main method to test your code, or use the main method in file TestBinaryHeap.java.

Hint: You should keep track of the last node of the heap by maintaining a pointer to that node. This helps simplify the code and enhance the efficiency of heap operations.

Notes:

- In this question, we implement min heaps. That is, the key of every non-leaf node in the heap is less than or equal to the keys of its children.
- The running time of insertion and deletion must be O(logN), where N is the size of the heap.
- Assume all user inputs are valid.
- Methods insert() and deleteMin() each is worth 50% of this question.
- Submission instruction:
    - websubmit: https://webapp.eecs.yorku.ca/submit/
    - submit command: submit 2011Z exam filename
- Do not modify the given class and method definitions. Do not add packages to the submitted Java files. Do not add I/O statements (e.g., scanner, print) to the submitted Java files. These mistakes will mess up our automatic grading programs and produce incorrect outputs.