Here are sample questions to practice for the upcoming midterm. Note some of these questions are designed to make you think (so that if I ask you similar questions on the midterm you can answer without thinking). ...if you get stuck, read over the class notes, and discuss it with me, Ta’s, random strangers in the hallway until you feel comfortable with the answers.

1) Define to the best of your abilities using complete sentences:
   a. What is a binary search tree ??
   b. What is an ADT ??
   c. What is a java Exception ??
   d. What is this line doing:
      import java.util.Vector;
   e. Infix notation
2) Java language questions:

a. What is java static exactly??

b. What is the job of the constructor method?

c. What if you leave it out??

d. What does ‘implement’ do??

e. What is the difference between x / y and x % y in java???
3) Consider the following method, what is the runtime?? what is the big-O:

```java
for ( int i=0; i < n; i++)
    for( int j=0; j < n; j++)
        for(int k=0; k < j; k ++)
            sum++;
```
4) Suppose you have two lists in sorted order. Can you describe a quick way of finding the median of both lists? give the big-O run time.
5) We know how easy it is to find the max or min on a binary search tree. Suppose we want to add an operation FINDKth to our toolbox of binary tree operations.

This operation returns the kth smallest item in the tree. Assume all items are distinct (no repeats) Explain how you would modify the binary tree structure to support FINDKth. This operation also must run in O (log N) average time, without sacrificing the time bound an any other operation currently in the tree

a. For example if we have 1000 items in a binary search tree and we want to find the 100th smallest item. Since the items are not necessarily all number from 0-1000 we want to quickly locate where the 100th smallest is in the tree.