Name:
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Algorithms and Data Structures 1
Quiz 2

1. Run the heapsort algorithm on the array $[31, 15, 52, 23, 68, 83, 71, 24]$. Display each rearrangement in the array.

2. Suppose that we have different integers between 1 and 15 in an array $A[1 : 15]$ for which the (maximum) heap property holds. List all possible values of $A[2]$. Justify your answer.

3. Insert the keys $45, 10, 7, 66, 12, 2, 51, 13, 39, 57$ into an initially empty binary search tree in the given order, and then delete these keys from the tree in the same order we inserted them.

4. Suppose that we have different numbers between 1 and 1000 in a binary search tree and want to search for the number 363. Which of the following sequences could not be the sequence of nodes examined? Justify your answer.

(A) 2, 399, 387, 219, 266, 382, 381, 278, 363.

(B) 935, 278, 347, 621, 299, 392, 358, 363.

5. Consider an n-node complete binary search tree T, where $n = 2^k - 1$ for some k. Each node of T contains a positive integer between 1 and 2^k. The numbers contained in the nodes are all distinct. Implement a procedure (structogram) which finds the missing positive integer between 1 and 2^k in T using only $O(\log n)$ comparisions.