Problem 4

When experimenting with the code we implemented in the problem 3, the average number of nodes on a path from the root to another node, in a random BST obtained by an iterated application of INSERT operation to a random permutation of numbers 1,2,…,n, is all around O(log2n). It, indeed follows the proof in the textbook section 5.2. The value is clearly less than 1 + 4logn ( as shown in the experiment below)

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The below is the records the experiments of our team:

The full result of the experiment is recorded in the experiment.txt. For each record, we compute the average number of nodes from root to another node and compare the value to the 1 + 4logn , which shows that our implementation works correctly for all test cases. You could look at the full test cases in the test folder. All the test cases are generated by the shuffle.py which is a python file to generate the input for our main program problem4.c

Note:

All the code for the program has been developed on the tux environment.

To successfully compile the problem4.c , you should add the gcc -lm option because I use the library <math.h>

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