



CSE30: Data Structures Take Home Final

Spring 2020

Instructions

Download the support code from CatCourses, found in a folder named “Support Code”. It contains a zip archive of a traditional C++ project from this class, with a `scratchpad.cpp` workspace, and some header files in the `inc` folder. Make sure you can compile and run the example code in the `scratchpad.cpp` file. Some of the questions that follow will require you to modify and run the code in `scratchpad.cpp`.

Answer the questions by typing your answers in a file, which you save in PDF format. If your answers are not in PDF format, we can not be sure that what we see on our computers is the same as what you wrote on your computer. There is a submission box for your answers in PDF format.

In addition, there is a submission box for a zip archive containing all the code (just zip the entire project folder) you wrote in answering the questions.

Questions

1. Explain how sorting the data that is stored in a list speeds up searches.
2. Assume we have sorted a list of N integers. Explain what needs to be done in order to insert another element in the list, while maintaining sorted order.
3. On your computer, how many milliseconds does it take to insert 10,000 random numbers into your list, while keeping sorted order after each insertion? Include a screenshot of the output from the program you used to test this.
4. Repeat the exercise from the last question, but this time with Binary Search Trees. That is, insert 10,000 random integers into a Binary Search Tree, and measure the amount of time taken.
5. Explain the why the running time of your programs in question 3 and question 4 differs so dramatically.