Programming Project 1

9/27/17

Part 1 draft is due **10/18/17** at 11:55pm on Canvas
Part 2 draft is due **10/25/17** at 11:55pm on Canvas
Parts 1, 2, 3 are due **11/2/17** at 11:55pm on Canvas (extended deadline)

2,3,4-trees (50 points)

The task of this programming assignment is to implement 2,3,4-trees, i.e., B-trees with minimum-degree $k = 2$. While the entire project is due on 11/1/17, you are required to submit a draft of part 1 on 10/18/17 and a draft of part 2 on 10/25/17. These drafts have to be reasonable attempts at writing the code, but it is ok if they are not fully functional yet. The draft points are awarded based on the drafts submitted by the draft deadline, the other points are awarded based on the final submission.

- **Part 1:** (10 points + 5 draft points) Define the node class for your 2,3,4-tree. Assume that keys are integers. Write a simple `print_tree` function that prints a (small) tree on the command line. For testing, hard-code the tree below as an example and run `print_tree` on it.
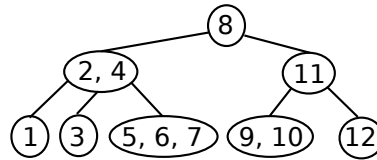
- **Part 2:** (10 points + 5 draft points) Implement the `search` function that we covered in class and test it on the tree above as well as on other trees.

- **Part 3:**

  1. (10 points) Implement the `insert` function that we covered in class and test it on the tree above as well as on other trees. Implement a `split` function to perform node splitting. Make sure that the insertion uses preemptive node splitting.
  2. (10 points) Test your entire code (parts 1, 2, 3) thoroughly. Include tests that insert sequences of numbers into an initially empty tree.

Comment your code thoroughly. Points will be deducted for poorly documented code. Projects have to be completed individually; group work is not allowed.

Turnin instructions

- You can use Python, Java, C, or C++ for this project.

- Turn in the individual source files of your project on Canvas.

- All projects need to compile and run. If your program does not compile you will receive 0 points on this project.

- Do not use any fancy libraries. We should be able to compile it under standard installs of Python, Java, C, or C++ under linux and/or windows.