

Homework Assignment 5 (Corrected)

CS 535 Design and Analysis of Algorithms
Fall Semester, 2016

Due: Thursday, September 29, 2016

Remember the Honesty Pledge!

1. At the top of page 4 in the notes on lazy weight-balanced trees, it is claimed that “after rebuilding all imbalances are zero in the subtree”. Prove this statement.
2. Redo the amortized analysis of insertion/deletion in lazy weight-balanced trees with

$$I(x) = |\text{size}(\text{left}(x)) - \text{size}(\text{right}(x))|$$

in the potential function.

3. **PhD Qualifying Exam Section Problem 5.** In the last section of the notes on lazy weight-balanced trees the possibility of coping without the size and height fields is discussed. Give detailed algorithms and amortized analyses for the method described there.
4. Problem 19.4-1 on page 526 of CLRS3.
5. **PhD Qualifying Exam Section Problem 6.** Problem 19.4-2 on page 526 of CLRS3 (don’t forget the case $k = 1$). Give amortized time bounds for all Fibonacci heap operations as a function of k .
6. Problem 19-3 on page 529 of CLRS3.