MAT-72006 Advanced Algorithms and Data Structures
November 10, 2016
HW 8: 17 Amortized Analysis, 19 Fibonacci Heaps

1.

Give an example of a situation that motivates amortized analysis, and argue for its usefulness.

2.

If the set of stack operations included a MULTIPUSH operation, which pushes k items onto the stack, would the $O(1)$ amortized cost of stack operations continue to hold?

3.

Suppose we perform a sequence of stack operations on a stack whose size never exceeds k. After every k operations, we make a copy of the entire stack for backup purposes. Show that the cost of n stack operations, including copying the stack, is $O(n)$ by assigning suitable amortized costs to the various stack operations.

4.

Suppose we perform a sequence of n operations on a data structure in which the ith operations costs i if it is an exact power of 2, and 1 otherwise. Use aggregate analysis to determine the amortized cost per operation.

5.

Redo problem **(4.)** using a potential method of analysis.