

University of Waterloo

CS240E, Winter 2024

Midterm Post-Mortem

Question 1

- part (j): many students gave a value that was one too low (e.g. 23, 37 65)

Question 2

- part (b): a common error was giving a final tree that is not an AVL tree
- part (b): errors in restructure were common
- part (c): some solutions did not create an imbalance

Question 3

- part (d): some solutions only considered one recursive call, while there are always two, regardless of the random outcome
- part (d): some solutions got the correct recurrence but did not recognize it as merge-sort and resolved it incorrectly

Question 4

- almost everyone claimed that a scapegoat tree is not oblivious. This is not true because sometimes the tree is rebuilt at the root
- similarly, almost everyone claimed that a binomial heap is not oblivious. If n is a power of two it is
- many solutions claimed that a treap is not oblivious. Keep in mind that the priorities in a treap are uniformly random, so a treap is oblivious indeed

Question 5

- everyone missed some cases, generally best case and absolute worst case
- the students kept asymptotic notation even if they knew the constant

Question 6

- parts (a), (b) were done well
- part (d) many solutions had the right approach but did not give even a quick justification.

Question 7

- this question was generally well done
- many solutions did not define time units. This was not penalized, but keep in mind that defining your time units, we really simplifies the arithmetic
- several solutions defined a potential function that is negative at some point during the algorithm. Please review the definition of a potential function

Question 8

- part (a): some solutions do not treat all the cases (found/not found) that but should be there