University of Waterloo
CS240E, Winter 2022
Midterm Post Mortem

This document goes over common errors and general student performance on the assignment questions. We put this together using feedback from the graders once they are done marking. It is meant to be used as a resource to understand what kind of stuff we look at while marking and some common areas where students can improve in.

Question 1 [5 + 4 = 9 marks]

a)-e) Generally well done.

f)-i) Generally well done. Some students forgot the end-of-word character for part f) and some gave incorrect answers for g)-i).

Question 2 [16 marks]

- The questions that students most commonly got wrong seem to be the following: k), h), e), n), o), p).

Question 3 [9 + 12 + 10 = 30 marks]

a) Generally well done, most common error was getting little-o and big-O for the second one.

b) Generally well done, the main error was stating that the randomized version vaguely "performs better" and not specifying when it performs better. Usually gave 1.5/2 for this.

c) Lots of errors/bad justifications here. Generally students did not realize that (exactly) one of nL, nR is ¡n/2, or that this recursion is from lecture. Several students "silently" assumed that nL is equally likely any of 0..n-1 (as mentioned in the marking guidelines) but many more assumed this explicitly. (usually took off 1 mark for that)

d) Lots of errors here too. A number of students didn't realize the left and right subtrees have the same size. Lots of students didn't square H((n-1)/2).

e) Lots of students got 1/2 or 1/8.

f) Well done, very few errors.

g) Lots of random answers here. Many students didn't use the exact sorting lower bound covered in lecture.

h) Lots of wrong answers here too

Question 4   [7 marks]

- Generally well done. Some students said splay trees were oblivious and compressed tries were not oblivious.

Question 5   [5 marks]

- This was definitely a bit "you got it or you didn't" with whether you had the idea of lazy deletion. Most students that didn't get that did at least have a reasonable idea (i.e. some sort of balanced tree data structure). Though some of these incorrect solutions were lacking in details in how any of the operations were implemented, and possibly would've gotten more partial points if they had given more details.

Question 6   [7 marks]

(a) Generally well-done.

(b) Mostly well-done. A few students only vaguely wrote "search for the leaf" without discussing how this changes the structure of the tree.

(c) Most students got the idea that the example from (b) would be a counter-example, but many struggled with expressing what exactly the contradiction is. Some students tried talking about a particular potential function (which you can't do, since you don't know what method the professor used).

Question 7   [(+5) marks]

- Many students got the idea that the split into flagged trees needs to be the same as the base-2 representation of n.

  Some students struggled how to build a flagged tree with the order-property in linear time. (Heapify!)

  Only a few students saw the direct 3-line solution, which is to simply create n single-node flagged trees in one (improper) binomial heap and then call makeProper.