

University of Waterloo
CS240E, Winter 2022
Assignment 3 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 [6 + 6 = 12 marks]

- a) was generally well done. Some students forgot that $T(I) = 0$ when I does not have a left child.
- b) Some students included $\log(0)$ in their sum and sometimes explicitly included $T(0)$ as a base case.

Question 2 [5 marks]

- A lot of students forgot to show that the bound was tight (i.e. it holds for infinitely many values of n). Some students proved by induction on n but did not consider proving that all values of n in $[4,16)$ work as a base case.

Question 3 [3 marks]

- Generally well done. A few students had the access cost as just 'i' instead of 'i+ 1'.

Question 4 [1 + 2 + 9(+5) + 4 = 16(+5) marks]

- a) Generally well done.
- b) Students sometimes did not consider the possibility a single rotation may be performed and some were sloppy about the height of the subtree rooted at x after i operations (or after just one zig-zig or zig-zag operation).
- c) Some students didn't describe the searches clearly enough.
- d) The most common error was that students forgot to consider the initial potential before any searches.

Question 5 [6 marks]

- Generally well done.

Question 6 [8 marks]

- The most common error is that students did not clearly describe how to compute the sorting permutation. Some students got the probability that any two strings match to 'k' digits wrong, and a few claimed the in-order traversal of a pruned trie would be $O(n)$.
- Some students also used quicksort instead of heapsort or mergesort, even though the worst case runtime is $O(n^2)$.