University of Waterloo
CS240, Spring 2021
Assignment 3 Post Mortem

Again, some students left out details regarding justification of run-time, justification of correctness. Whenever you design an algorithm/data structure, don't forget these!

Problem 1 [3+3+3=9 marks]

- Some students did not explicitly state their base case, inductive hypothesis, and inductive step. Others forgot the base case.
- For part a), some students used handwavy explanations that essentially restated the line they were asked to prove.

Problem 2 [10 marks]

- Many students add T1 as left, T2 as right to a new node without considering the potential large difference in height between them. If T1 and T2's heights are very different, calling restructure will not be able to eventually rebalance the tree.

Problem 3 [12 marks]

- Some students used one AVL that stores the keys and timestamps. However, it can only be sorted by one of them, so some operations do not run fast enough.
- Some students used BSTs or skip-lists for their ADT, which have an worst case runtime of $O(n)$, not $O(\log n)$.
- The original intent for problem 3 was for delete_ith and get_index to operate based on relative insertion order. However, we accepted the implementations that used fixed timestamps.

Problem 4 [6+6=12 marks]

- Some students left out the sentinels in part a).
- Some students didn't adequately describe or explicitly write out the subsets S1 and S2.

Problem 5 [3+3+3=9 marks]

- Some students made a mistake at the start of part c), causing the total and three intermediate sequences to be incorrect (specifically, getting a total of 68 instead of 70).