

University of Waterloo

CS240 Winter 2024

Assignment 3 Post-Mortem

General

- Some students had incorrect file name. Please make sure to have correct file, including .pdf extension. Moreover, make sure that your submission contains correct contents as well.
- Some students submitted their hand-written work, which is totally fine as long as it is legible.

Question 1

- This question done nicely.

Question 2

- Part a), b), c) was done nicely.
- For part d), some students did not address proper amount of details when it comes addressing the height change after all the rotations. The type of imbalance that we observe does not guarantee the height of whole tree deduced by 1. We were looking for details related to height of each subtree and where would they be located after the final rotation, as they are critical in justifying reduced height of whole tree.

Question 3

- Part a) was done nicely.
- For part b), some students found a probability that height of each tower being larger than or equal to 4, which leads to final answer related to $\frac{1}{81}$. This approach is incorrect and received some deductions.

Question 4

- This question probably is the most challenging question in whole assignment.
- Some students simply stated that expected number of skip-forward, as discussed in the lecture, is $O(1)$. This statement is closely related to part a), but this statement does not directly justify your claim. Missing such details received some deductions.

- For part b), some students did not address how *maxVal* field must be computed for nodes in the newly inserted tower when discussing *insert* function. Missing such details received some deductions.
- For part c), the key idea was to notice that all nodes in the path while executing *getPredecessor(x)* was required, especially those nodes where we skip-forward. Some students tried to describe an algorithm that only uses those nodes in the returned stack and this does not give us enough information to solve this problem correctly. Missing such details received some deductions.

Question 5

- This question was done nicely.
- For part c), some students did not give enough details on how they have got such asymptotic bound on each case and received some deductions.

Question 6

- Part a) was done nicely.
- For part b), some students did not include *ceiling* so that *m* becomes integer and received deductions. As mentioned in Piazza, your new formula should work for arbitrary input array, but when input array is in described form in the question, then your formula should locate the key in one round.