University of Waterloo
CS240 Winter 2024
Assignment 2 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 [2+3+5=10 marks]

- Some students have got incorrect final answer for part b).
- Also for part b), it is critical to observe that a leaf can be located in last two levels and largest possible leaf should be at second last level. Some students did not mention this point and received some deductions.
- For part c), Some students did not justify the correctness of their algorithm. Students are required to briefly justify the correctness.

Question 2 [2+3+2+4=11 marks]

- For part a), some students did not notice that there are 2 comparisons being done in each level. This resulted in incorrect final answer and received deductions.
- For part b), students were expected to notice two main issues with this algorithm. Some students only mentioned one of issues and received deductions.
- For part d), some students did not include justification of correctness in their algorithm.
  - One of important arguments that we were looking for was to explain why shifting down elements in the path within a heap does not violate heap order property.
- Some students stated to use an algorithms like `heapify, fix-down, fix-up`. These algorithm does not meet required number of comparisons.

Question 3 [1+1+5=7 marks]

- For part c), Some students had difficulty in finding out how many instances correspond to each runtime cases.
- Though we are not as strict as math courses, we still require students to show some level of mathematical works in their solution. Some submissions were missing significant amount of details and hence received deductions.

Question 4 [5 marks]

- Some students did not follow the proper steps when it comes to analyzing expected runtime of an algorithm. As mentioned in Piazza post, students are encouraged to follow the style of analysis that was done during the lecture.
- Some students made a mistake when replacing $T(A, < i, R' >)$ with recursive expressions (i.e. from line (2) to (3) in the sample solution posted).
- Some students had the recurrence relation in terms of $n-2$, rather than $n-1$. Since we are taking index up to $n-2$, the size should be reduced to $n-1$ from n. Such mistakes received some deductions.

Question 5 [5 marks]

- This question was done well overall.

Question 6 [5 marks]

- This question was done nicely overall.
- Some students stated that sorting each block will result in sorted array without any extra operation.

Question 7 [2+2+2+3=9 marks]

- For part c), some student did not mention that it needs n^{10} buckets in this context to run BucketSort. Such approach received some deductions.
- For part d), we were looking for explicit statement on your choice of R and resulting value of m as their value will be important when it comes to justifying runtime of LSD-Radix Sort.
- Also, we were also looking for how we can change any number within given range can be converted into base n number. Though students did not have to give a proper method on how such operation can be done, students who did not mention that this process can be done in $O(1)$ time recieved some deductions.