University of Waterloo
CS240 Winter 2024
Assignment 1 Post-Mortem

Question 1 [3+3+3+3+3=15 marks]

- Some students made a mistake while working/solving desired inequalities.
- For part d) and e), some students had n_0 in terms of n, which is not a correct approach.
- For part d) and e), some students ended up with a statement that desired inequality is true for $n_0 \leq f(c)$ where $f(c)$ is a function in terms of c. This is not a desired statement that we want to show and received deductions.

Question 2 [2+4=6 marks]

- This question was nicely done overall.
- For part b), some students forgot to take max of all n_0s that was given as part of definition. This was one of important details in this question and missing such detail received proper deductions.

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

- This question was well done overall.
- For part a) and b), some students did not show how they were able to evaluate limit. Though your proof does not need to be as detailed as MATH 137/138 proof, with these type of questions, some details and work needs to be shown.
- For part c), we cannot use limit theorem directly. That is, one cannot conclude directly that $\lim_{n\to\infty} \frac{f(n)}{g(n)} = \infty$, and such approaches received deductions.

Question 4 [3+3+3+3=12 marks]

- For part c), some students concluded that runtime is $\Theta(n^4 \log n)$. Though this seems to be intuitive answer, as you can find in the sample solution, the actual answer is different to our intuition.
- Some students tried to explain the runtime without summation. Using words is acceptable, however, it need to contain good amount of details. Missing some important details received proper deductions.

Question 5 [4+4 = 8 marks]

- Part a) was done nicely.
- For part b), some students tried to show a single counter example for k value. However, correction was made via Piazza and to disprove this statement, a single counter example is not sufficient enough. Such approach received deductions.

Question 6 [1+4 = 5 marks]

- This question was done nicely as well.
- Some students missed to show how we can find a new constant factor by using max. This detail was the key of this question and missing those details received proper deductions.