CSE 332 Summer 18 Exercise 03

Algorithm Analysis II – Proofs

Due Date: Friday July 6 Submit as a pdf to gradescope.

For all parts, include both any scratch work you do to find c, n_0 values, and the proof itself (clearly labeled).

- 1. (5 points) Suppose we have an algorithm that runs in $\mathcal{O}(n)$ time, but we make some changes to the code that cause it to run 10 times slower for all inputs. Formally prove that the running time of the algorithm is still $\mathcal{O}(n)$.
- 2. (8 points) Prove that 2^{n+3} is $\Theta(2^n)$.
- 3. (7 points) Show that $(4^n)^{1/3}$ is not $\Omega(4^n)$.
 - (a) Write the negation of the definition of "f(n) is $\Omega(g(n))$ " (Hint: your answer should have "for all" and "there exists" in it)
 - (b) Use the statement in part (a) to prove $(4^n)^{1/3}$ is not $\Omega(4^n)$.