CSE 332: Data Structures and Parallelism

Exercises (Asymptotics)

Directions: *Submission instructions coming soon! You must use a pdf file.*

EX05. Hell-$\mathcal{O}$! (20 points)

Use the formal definitions of Big-Oh, Big-Omega, and Big-Theta to *prove or disprove* each of the following statements. You should assume that the domain and co-domain of all functions in this exercise are the natural numbers. If you wish to disprove the claim, negate the quantified statement and prove the negation. We expect an English proof, thus something more formal that just picking a c and n0 value. You may not use Calculus (e.g., limits, differentiation, integrals) for these questions.

(a) [6 Points] If we have an algorithm that runs in $\mathcal{O}(n)$ time and make some changes that cause it to run 10 times slower for all inputs, it will still run in $\mathcal{O}(n)$ time.

(b) [7 Points] $(2^n)^{1/3} \in \Theta(2^n)$

   Note that this one is harder than the others.

(c) [7 Points] $2^{n+3} \in \Theta(2^n)$