Asymptotic Notation—Monday, September 14 / Tuesday, September 15

Readings
- [Lecture Notes Chapter 5: Running Time and Growth Functions]

Problems

Problem 0 [True or False]
1. A Big-O and Big-Omega bound for an algorithm correspond to worst-case and best-case runtime, respectively.
2. For any two functions, \( f \) and \( g \), either \( f \in O(g) \) or \( g \in O(f) \).
3. \( f(n) \in O(g(n)) \) if and only if \( g(n) \in \Omega(f(n)) \).

Problem 1
Prove that \( 3n^2 + 100n = \Theta(5n^2) \)

Problem 2
Prove using induction that \( n \log n = \Omega(n) \)

Problem 3
Prove that \( \log(n!) = \Theta(n \log n) \).