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 $g(n) \in \Omega(f(n))$.
4. If $f(n) \in O(g(n))$ then $f(n) \in o(g(n))$.
5. If $f(n) \in o(g(n))$ then $f(n) \in O(g(n))$.

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

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

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