CMSC 14300 - Summer 2025 — Konstantinos Ameranis
due 7/28/2025 via Gradescope

H4.

Problem 1 (Asymptotic Complexity) *For each of the following answer **True** or **False** with brief explanation.*

(a) (1 point) $3n^2 + 5n + 3 = O(n^2)$ ◯ *True* ◯ *False*

(b) (1 point) $5n = \Omega(\log n)$ ◯ *True* ◯ *False*

(c) (1 point) $\log n = O(n)$ ◯ *True* ◯ *False*

(d) (1 point) $\log^{1000} n = O(n)$ ◯ *True* ◯ *False*

(e) (1 point) $2^n = \Theta(3^n)$ ◯ *True* ◯ *False*

(f) (1 point) $n^{50} = O(1.01^n)$ ◯ *True* ◯ *False*

Problem 2 (Asymptotic Complexity properties) *It is known that if $f_1(n) = O(g(n))$ and $f_2(n) = O(g(n))$ then $f_1(n) + f_2(n) = O(g(n))$. If there is a family of functions $f_i = O(g(n))$, then*

(a) (2 points) $\sum_{i=1}^{n} \frac{1}{i^2} f_i(n) = O(g(n))$ ◯ *True* ◯ *False* ◯ *Depends*

(b) (2 points) $\sum_{i=1}^{n} \frac{1}{i} f_i(n) = O(g(n))$ ◯ *True* ◯ *False* ◯ *Depends*

Problem 3 *How many hours did you spend for this assignment?*

Problem 4 *What is the most difficult aspect of this assignment, if any?*

Problem 5 *Document your collaboration here.*