
csce350 — Data Structures and Algorithms
Fall 2019 — Homework 00

Assigned: August 21

Due: never

✓ This assignment is an optional reminder of math background that will be needed for this course.

1. **Sets:** Decide whether each of the following statements about sets are true or false.

(a) $\{1, 2, 3\} = \{3, 2, 1\}$

(b) $\{1, 2, 3\} \cup \{2, 3\} = \{1, 2, 3\}$

(c) $\{1, 2, 3, 4\} \cap \{2, 3\} = \{1, 3\} \cup \{2, 4\}$

(d) $\{x \mid x \text{ is an integer and } 0 < x < 4\} = \{1, 2, \dots, 10\} \cap \{4, 5, \dots, 10\}$

(e) $\{1, 2, 3\} \cap \{4, 5, 6\} = \{0\}$

2. **Summations:** Evaluate each of the following expressions.

(a) $\sum_{i=1}^{100} 5$

(b) $\sum_{i=1}^{100} i$

(c) $\sum_{i=1}^{100} 3i$

(d) $\sum_{i=1}^{60} \sum_{j=4}^{63} 1$

(e) $\sum_{i=1}^{100} 1 + 2 + 3$

(f) $\sum_{i=1}^{100} (1 + 2 + 3)$

3. **Floors and ceilings:** Evaluate each of the following expressions.

(a) $\lfloor 3.4 \rfloor$

(b) $\lceil 3.4 \rceil$

(c) $\lfloor -6.5 \rfloor$

(d) $\lceil -6.5 \rceil$

(e) $\lfloor 8 \rfloor$

(f) $\lceil 0 \rceil$

4. **Logarithms:** Rewrite each of the following expressions in a form that does not contain the log function.

(a) $\log_2 8$

(b) $\log_2 1$

(c) $\log_2 (2^x 8^y 4^z)$

5. **Limits:** Use L'Hôpital's rule to evaluate the following limits.

(a) $\lim_{n \rightarrow \infty} \frac{10n^2 + n + 5}{20n^2 + 40n + 5000}$

(b) $\lim_{n \rightarrow \infty} \frac{\sqrt[3]{n}}{\log_3 n}$

6. **Inequalities:** Decide whether each of the following statements are true or false.

(a) For any $n > 0$, the inequality $100n + 5 < 100n + n$ holds.

(b) For any $n > 5$, the inequality $100n + 5 < 100n + n$ holds.

(c) For any $n > 0$, the inequality $3n^2 + 5n > 3n^2$ holds.

(d) For any $n > 5$, the inequality $3n^2 + 5n > 3n^2$ holds.