CSE 3302 Programming Language

Homework2 - Fall 2026

Due Date: Feb.2, 2026, 11:59 PM

Problem1 - 30%

Prove by induction: If *add* n_1 n_2 n_3, then *add* n_2 n_1 n_3 (the commutative law of addition), where *add* n_1 n_2 n_3 is the judgment form for addition defined in the lecture (slide page 23).
(**Hint**: You may begin by proving the following lemma: If n *nat*, then *add* n Z n.)

Problem2 - 30%

Prove **Lemma 2** using *induction on the derivation of* len l n, instead of append.
(slide page 35).

Problem3 - 40%

(a) Give an inductive definition of the judgment form leq n_1 n_2, which indicates that n_1 is less than or equal to n_2, and n_1 and n_2 are defined by judgement form n nat in the lecture.

(b) Prove by induction: If n_1 nat, n_2 nat, leq n_1 n_2 and leq n_2 n_1, then $n_1 = n_2$.

Submission Format: Submit only the `.pdf` version of your homework (typed submissions are preferred; Scanned images must be readable). File must be named `lastname_studentID_hw2.pdf`.