## Lab 05: Structures

Create a separate file for each question. Keep them in your "Labs" folder, with the name lijqk for Lab ij, Question k.

Download the headers for each function from the file labinterface05.rkt linked off the "Labs" page on the course Web site.

After you have completed a question (except class exercises), including creating tests for it, you can obtain feedback by submitting it and requesting a public test. Follow the instructions given in the Style Guide.

This lab makes use of the following structure and data definitions:

(define-struct game (winner loser high low))

;; A game is a structure (make-game w I hi lo), where

- ;; \* w is a string,
- ;; \* I is a string,
- ;; \* hi is a nat, and
- ;; \* lo is a nat such that hi is greater than lo.

(define-struct timer (hours mins secs))

- ;; An timer is a structure (make-timer h m s), where
- ;; \* h is a natural number,
- ;; \* m is an integer in the range from 0 to 59, and
- ;; \* s is an integer in the range from 0 to 59.

(define-struct clock (hours mins))

- ;; A clock is a structure (make-clock h m), where
- ;; \* h is an integer in the range from 0 to 23 and
- ;; \* m is an integer in the range from 0 to 59.

(define-struct card (value suit))

- ;; A card is a structure (make-card v s), where
- ;; \* v is an integer in the range from 1 to 10 and
- ;; \* s is a symbols from the set 'hearts, 'diamonds,
- ;; 'spades, and 'clubs.

## Language level: Beginning Student.

- 1. *[Class exercise with lab instructor assistance]* Create a function fixed-game that consumes a game g and produces the game formed by giving all of the loser's points to the winner.
- 2. Create a function **convert-time** that consumes a **timer** and produces the equivalent time in seconds.
- 3. Create a function bigger-card that consumes two cards and produces the card with the higher value (or the second card if they have the same value). Hint: the suit of the card has no impact on its value.
- 4. Create a function big-card-small-suit that consumes two cards and produces a card as follows: the card produced will have the value of the card with higher value and the suit of the card with lower value. If the two cards consumed have the same value, then the card produced should have the suit of the first card.
- 5. Create a function dur that consumes two clock structures and produces an integer indicating the number of minutes elapsed between two times. If the second time is later than the first, you can assume that both times are on the same day. If the second time is earlier than the first, you can assume that the first time is on one day and the second time is on the next day. One way to approach this problem is to write a helper function that determines if two times are on the same day.

6. *Optional open-ended question* Choose a simple game or puzzle and devise a structure to represent it. Write one or more functions that consume a structure and produce the structure representing how it would change after a single move.