## Lab 12: Local, functional abstraction

Create a separate file for each question. Keep them in your "Labs" folder, with the name liiqj for Lab *ii*, Question *j*.

Download the headers for each function from the file labinterface12.rkt linked off the "Labs" page on the course Web site.

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

## (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.

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.

Language level: Intermediate Student

**Important note:** For each question, all helper functions must be included in the main function, using *local*.

- 1. [*Class exercise with lab instructor assistance*] Using at least one of *map*, *filter*, and *foldr*, create a function *make-canadian* that consumes a string and produces a string in which each o is replaced by ou.
- 2. Using at least one of *map*, *filter*, and *foldr*, create a function *find-hearts* that consumes a list of *cards* and produces the *cards* in the list that have the suit 'hearts.
- 3. Using *foldr*, create a function *count-suit* that consumes a list of *cards* and a symbol *asuit* and produces the number of *cards* in the list with suit *asuit*.
- 4. Using at least one of *map*, *filter*, and *foldr*, create a function *switch-case* that consumes a string and produces the result of replacing each upper-case letter by the equivalent lower-case letter, each lower-case letter by the equivalent upper-case letter, and preserving all other characters.
- 5. Using at least one of *map*, *filter*, and *foldr*, create a function *count-even-strings* that consumes a list of strings and produces the number of strings in the list that have even length.
- 6. Optional open-ended questions
  - (a) There are multiple solutions to the questions above; see how many you can find. As a starting point, remember that you can use *foldr* to implement the other abstract list functions.
  - (b) Go through previous assignments and labs to see where you can add the elegance of local and abstract list functions.