

Concepts of Programming Languages, CSCI 305, Fall 2021
Lab 7, Reading a csv file in Scheme, Nov. 5

1. Copy the following code into Scheme and figure out the scope of the variables: “inPort”, “outPort” and “line”. Modify the code, adding newlines and comments, to clarify the scope of these variables.

```
#lang racket
(define readWriteFiles
  (lambda ()
    (begin
      (display "Getting started")
      (newline)
      (let
        ((inPort (open-input-file "lab7_test.csv"))
         (outPort (open-output-file "lab7_output.txt" #:exists 'replace)))
        (begin
          (display "Ports are open.")
          (newline)
          (let
            ((line (read-line inPort)))
            (begin
              (display "Line of text to place into output file: ")
              (display line)
              (display line outPort)))
            (close-input-port inPort)
            (close-output-port outPort)
            (display "Files are released")
            (newline))))))
  )
(readWriteFiles)
```

Sample answer

```
#lang racket
(define readWriteFiles
  (lambda ()
    (begin
      (display "Getting started")
      (newline)
      (let ; Assignments of 'let'
        ; List pairs, first element is bound to the evaluation of the second element
        ((inPort (open-input-file "lab7_test.csv"))
         (outPort (open-output-file "lab7_out.txt" #:exists 'replace)
                  ; #:exists is a mode-flag
         ))
      )
      (begin ; Body of 'let'
        (display "Ports are open.")
        (newline)
        (let
          ((line (read-line inPort))) ; Assignments of 'let'
          (begin ; Body of 'let'
            (display "Line of text to place into output file: ")
            (display line)
            (display line outPort)
          )
        ) ; inner 'let'
        (close-input-port inPort)
        (close-output-port outPort)
        (display "Files are released")
        (newline)
      )
    ); 'let'
  );begin
)
)

(readWriteFiles)
```

- Place the file *lab7_test.csv* into the same directory as the Scheme code above, run the code and see that the new file was created.
- Notice that the code only reads one line from *lab7_test.csv*. Modify the code so that it reads all the lines from *lab7_test.csv* and writes them to the output file. A good way to do this is to define a recursive function *readAll*, which takes opened input and output ports, and reads from the input port and writes to the output port. This function could be called as follows:

```
#lang racket
(define readWriteFiles
  (lambda ()
    (begin
      (display "Getting started")
      (newline)
      (let
        ((inPort (open-input-file "lab7_test.csv"))
         (outPort (open-output-file "lab7_out.txt" #:exists 'replace)))
          )
        (begin
          (display "Ports are open.")
          (newline)
          (readAll inPort outPort) ; <----- helper function readAll
          (close-input-port inPort)
          (close-output-port outPort)
          (display "Files are released")
          (newline)
          )
        )
      ) ;let
    ) ;begin
  )
)
```

Give the definition of the helper function *readAll*.

Possible answer:

```
(define readAll
  (lambda(in out)
    (let
      ((line (read-line in))) ; Assignments of 'let'
      (unless (eof-object? line) ; Body of 'let'
        (begin ; Body of 'unless'
          (display "Line of text to place into output file:")
          (display line)
          (display line out)
          (readAll in out)
        ) ; begin
      ) ;unless
    ) ; let
  ) ; lambda
) ; define
```

4. Install the package csv-reading as follows:

Within DrRacket, under the File Menu (upper left corner)

File\Package Manager

Select the “Available from catalog” tab of the Package Manager

Locate the package **csv-reading** written by neil@neilvandyke.org
(can filter by neil@neilvandyke.org)

Install csv-reading

More information on this package:

<https://docs.racket-lang.org/csv-reading/index.html>

5. Place the file *scanningTable.csv* into the same directory as the Scheme code and experiment with the following code. #lang racket

```
(require csv-reading) ; Package that contains utilities for reading csv files.
```

```
; Build a reader that can read a csv file containing the scan table.
```

```
; Use the default parameters.
```

```
(define scanTable-csv-reader  
  (make-csv-reader-maker '()))  
)
```

```
; Function that uses the csv reader to open a csv file once, and allow
```

```
; repeatedly reading the next row, returning the row contents as a list.
```

```
(define next-row  
  (scanTable-csv-reader (open-input-file "scanningTable.csv"))  
)
```

```
; Function that reads and displays each row of the csv file as a list.
```

```
(define display-contents  
  (lambda ()  
    (let  
      ((line (next-row)))  
      (unless (null? line)  
        (begin  
          (display "Next line: ")  
          (display line)  
          (newline)  
          (display-contents)  
          )))))
```

```
(display-contents)
```

6. Consider helper functions that will be useful for your lexical analyzer and begin writing code for those.

Given a state, the list of symbols (the column headings in the scanning table) and the list of new states (the row of the scanning table corresponding to the given state), build the structure for this row of data:

```
( ((state symbol) nextState) ((state symbol) nextState) ...  
  ((state symbol) nextState) )
```