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Dr. Sengupta
CSC 408
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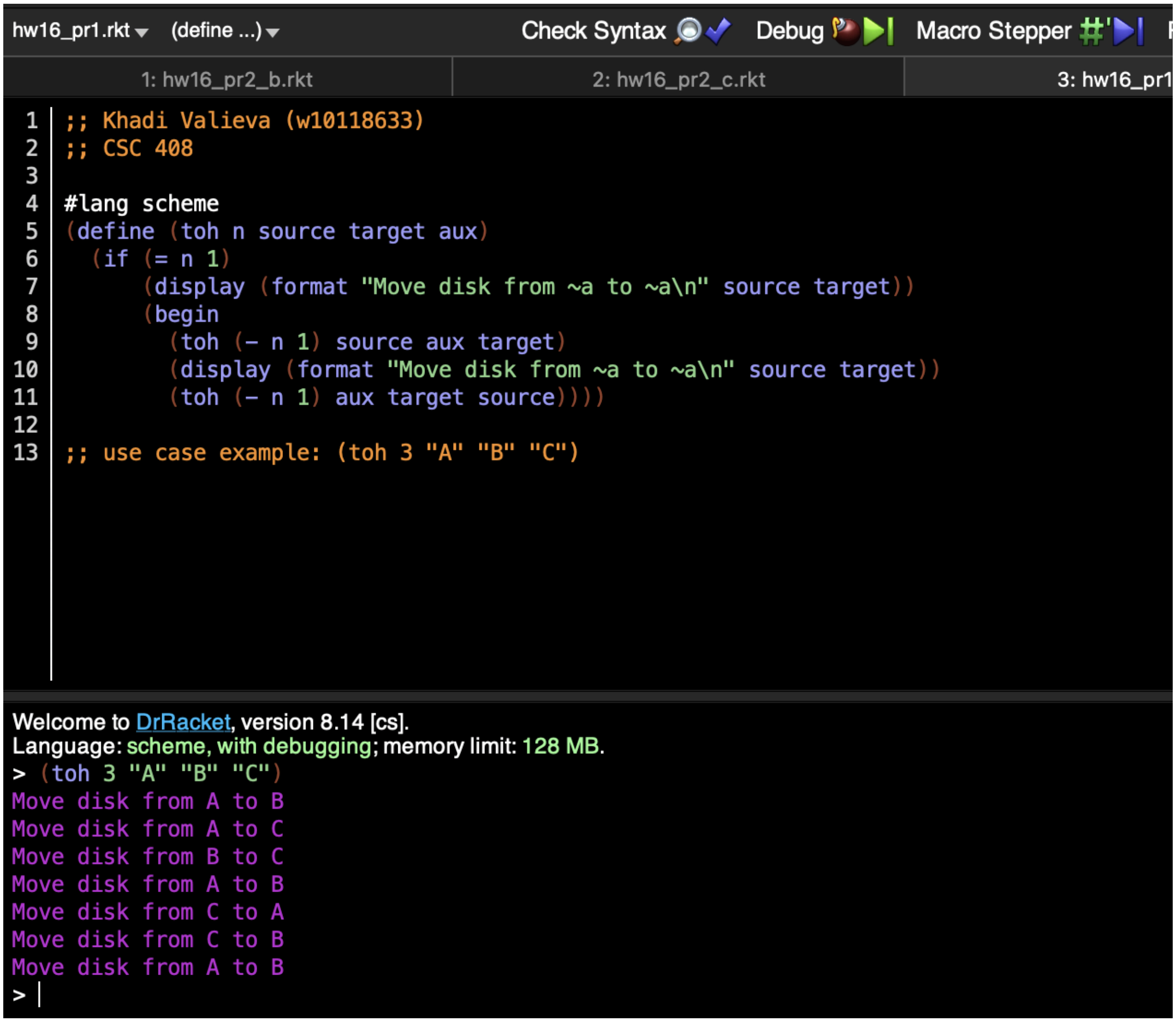
Homework 16

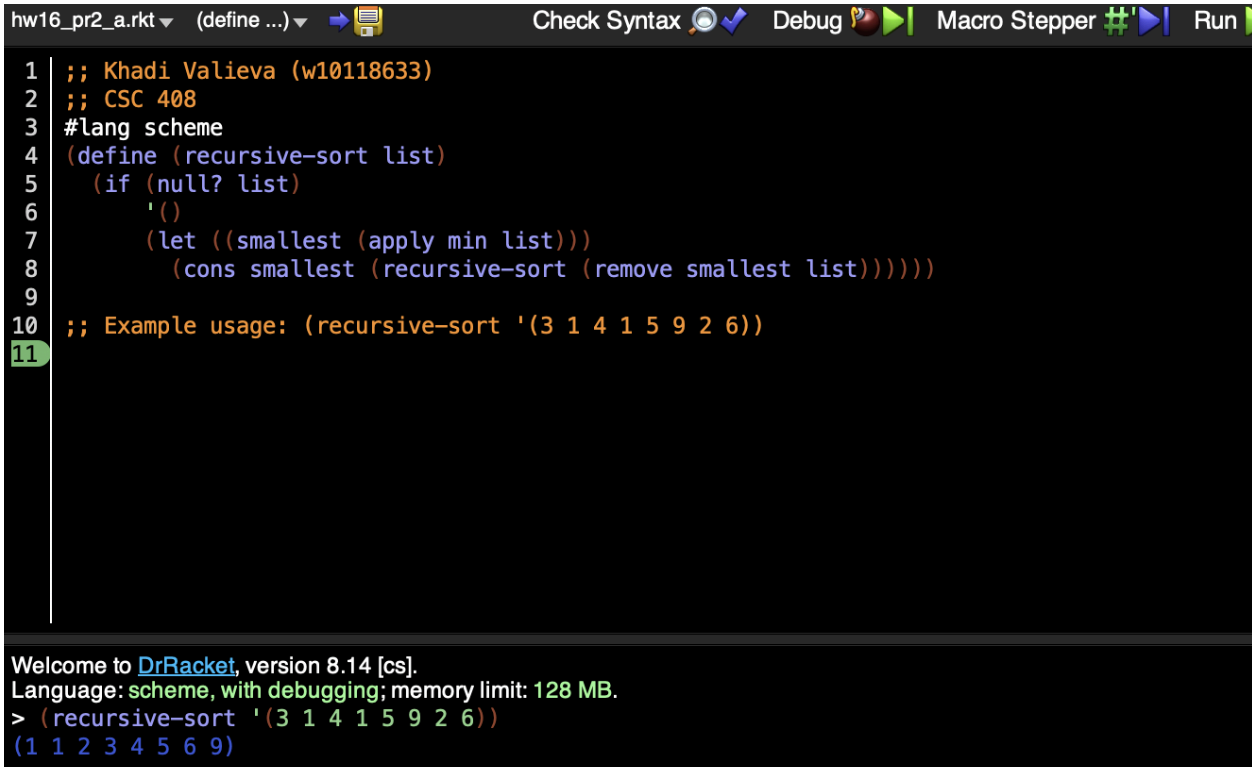
Problem 1



```
;; Khadi Valieva (w10118633)
;; CSC 408

#lang scheme
(define (toh n source target aux)
  (if (= n 1)
      (display (format "Move disk from ~a to ~a\n" source target))
      (begin
        (toh (- n 1) source aux target)
        (display (format "Move disk from ~a to ~a\n" source target))
        (toh (- n 1) aux target source))))

;; use case example: (toh 3 "A" "B" "C")
```

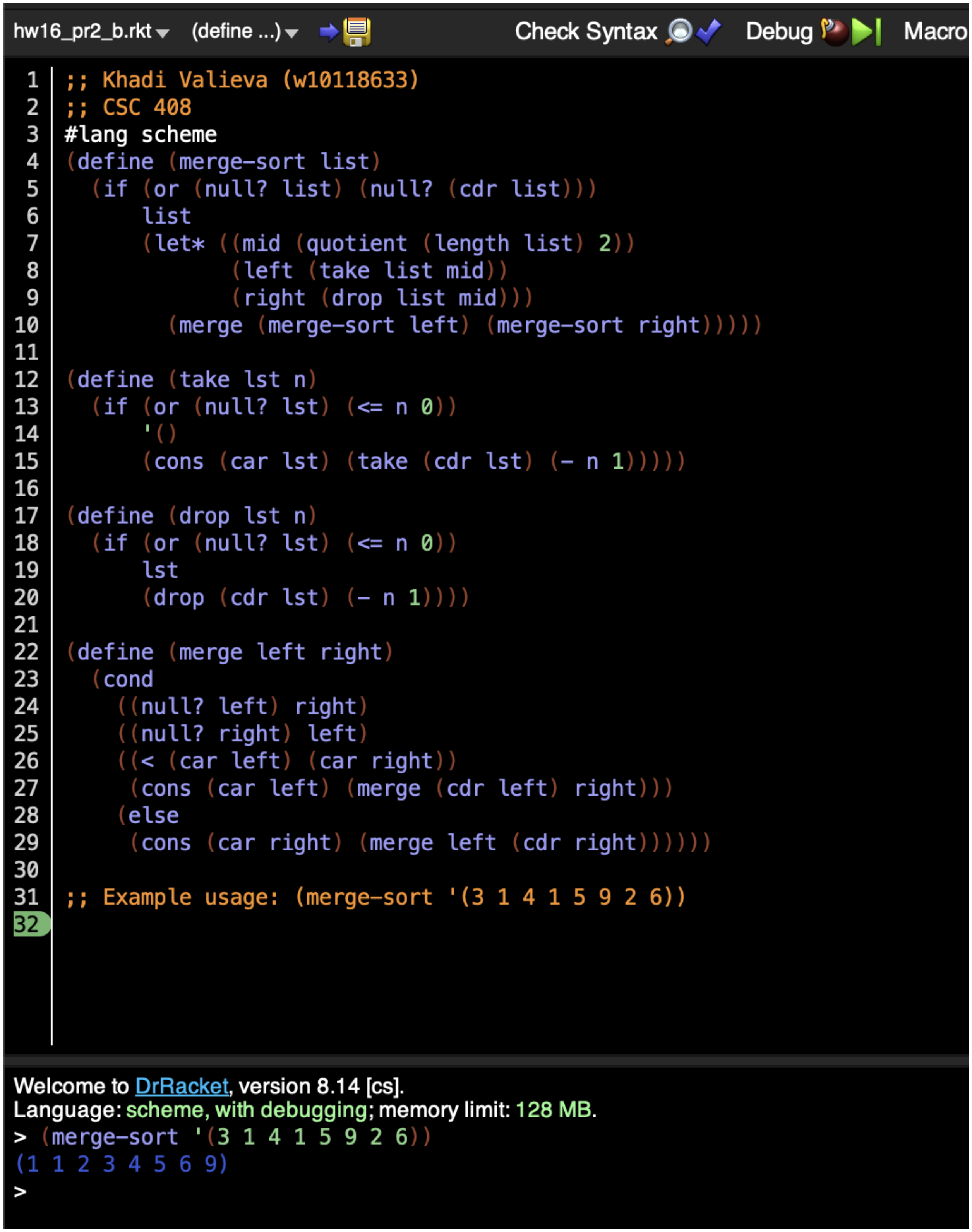
```
Welcome to DrRacket, version 8.14 [cs].
Language: scheme, with debugging; memory limit: 128 MB.
> (toh 3 "A" "B" "C")
Move disk from A to B
Move disk from A to C
Move disk from B to C
Move disk from A to B
Move disk from C to A
Move disk from C to B
Move disk from A to B
> 
```

Problem 2



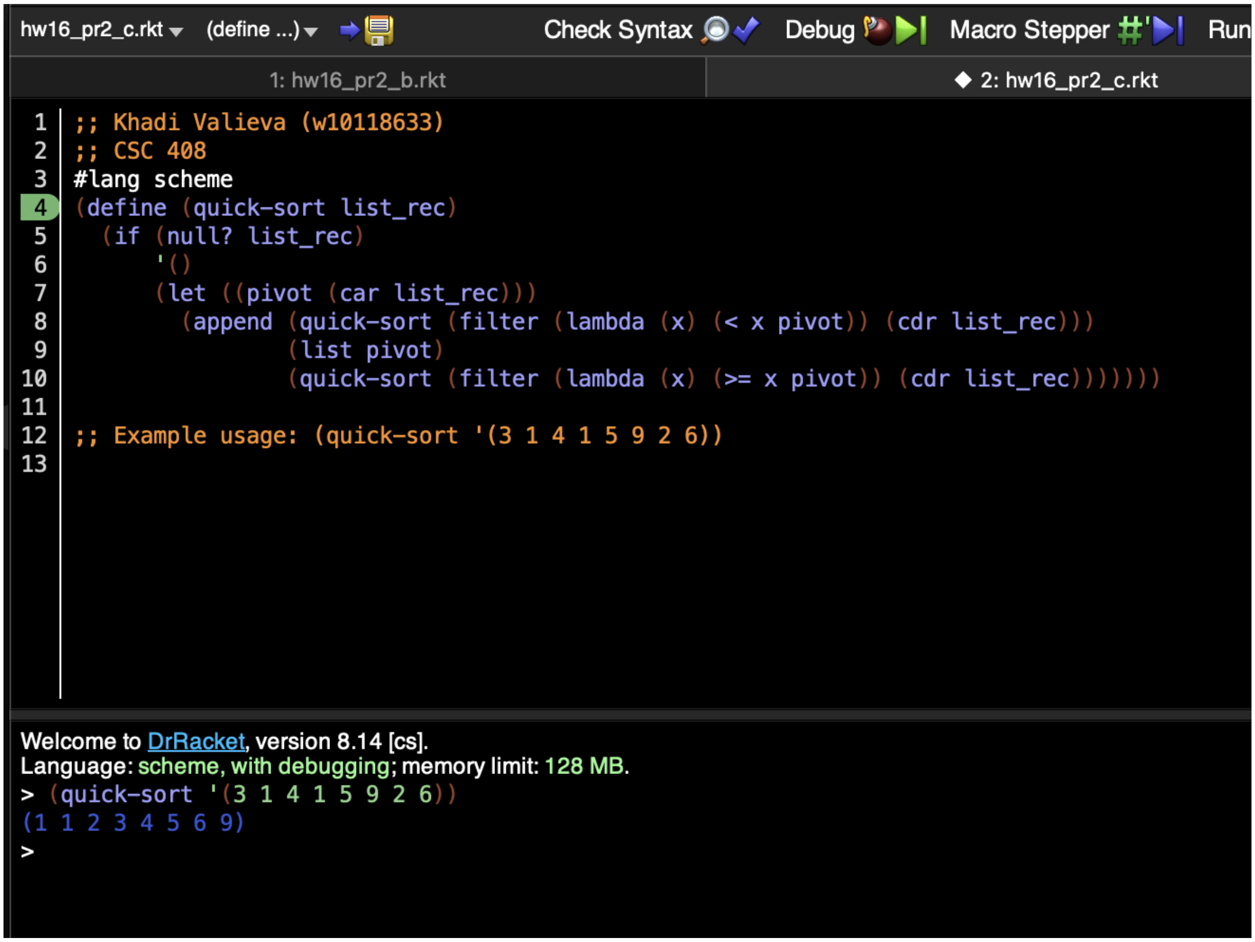
```
;; Khadi Valieva (w10118633)
;; CSC 408
#lang scheme
(define (recursive-sort list)
  (if (null? list)
      '()
      (let ((smallest (apply min list)))
        (cons smallest (recursive-sort (remove smallest list))))))

;; Example usage: (recursive-sort '(3 1 4 1 5 9 2 6))
```

```
Welcome to DrRacket, version 8.14 [cs].
Language: scheme, with debugging; memory limit: 128 MB.
> (recursive-sort '(3 1 4 1 5 9 2 6))
(1 1 2 3 4 5 6 9)
```



```scheme
;; Khadi Valieva (w10118633)
;; CSC 408
#lang scheme
(define (merge-sort list)
  (if (or (null? list) (null? (cdr list)))
      list
      (let* ((mid (quotient (length list) 2))
             (left (take list mid))
             (right (drop list mid)))
        (merge (merge-sort left) (merge-sort right)))))

(define (take lst n)
  (if (or (null? lst) (<= n 0))
      '()
      (cons (car lst) (take (cdr lst) (- n 1)))))

(define (drop lst n)
  (if (or (null? lst) (<= n 0))
      lst
      (drop (cdr lst) (- n 1))))

(define (merge left right)
  (cond
    ((null? left) right)
    ((null? right) left)
    ((< (car left) (car right))
     (cons (car left) (merge (cdr left) right)))
    (else
     (cons (car right) (merge left (cdr right))))))

;; Example usage: (merge-sort '(3 1 4 1 5 9 2 6))
```

```
Welcome to DrRacket, version 8.14 [cs].
Language: scheme, with debugging; memory limit: 128 MB.
> (merge-sort '(3 1 4 1 5 9 2 6))
(1 1 2 3 4 5 6 9)
>
```



```scheme
;; Khadi Valieva (w10118633)
;; CSC 408
#lang scheme
(define (quick-sort list_rec)
  (if (null? list_rec)
      '()
      (let ((pivot (car list_rec)))
        (append (quick-sort (filter (lambda (x) (< x pivot)) (cdr list_rec)))
                (list pivot)
                (quick-sort (filter (lambda (x) (>= x pivot)) (cdr list_rec)))))))

;; Example usage: (quick-sort '(3 1 4 1 5 9 2 6))

```

```
Welcome to DrRacket, version 8.14 [cs].
Language: scheme, with debugging; memory limit: 128 MB.
> (quick-sort '(3 1 4 1 5 9 2 6))
(1 1 2 3 4 5 6 9)
>
```