Man Tik Li
CS 360 – 002
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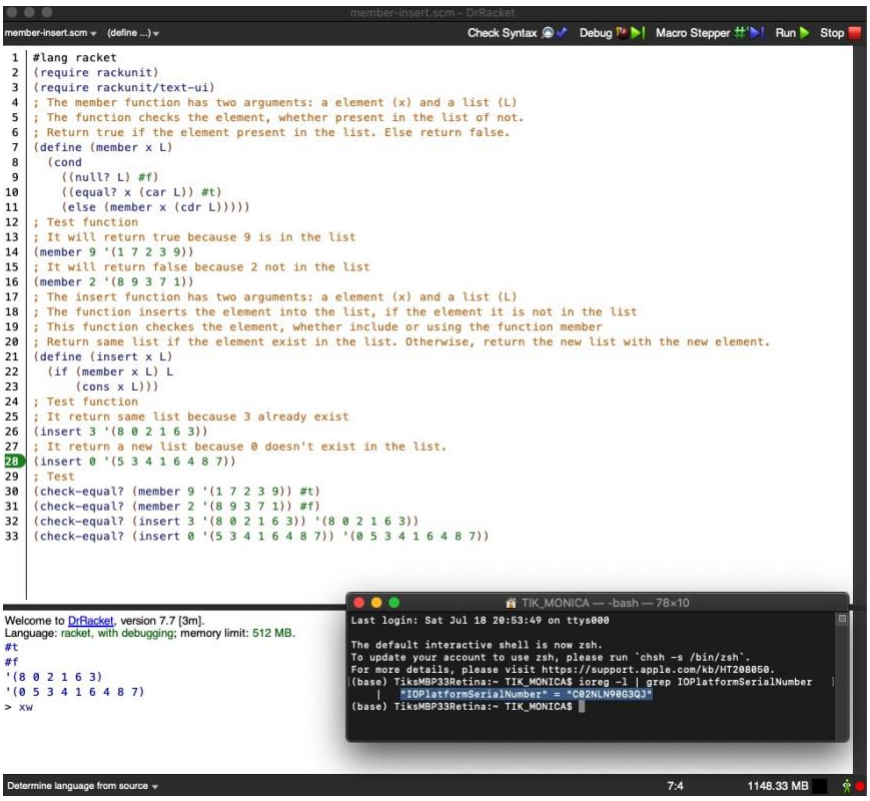
July 17, 2020

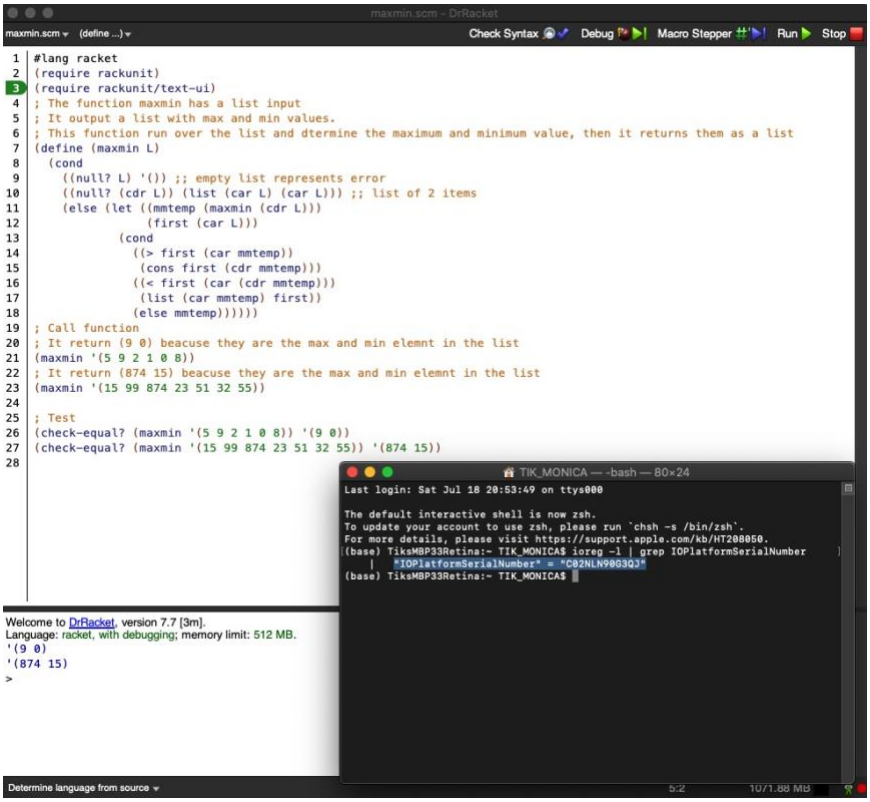
Lab 1

1.

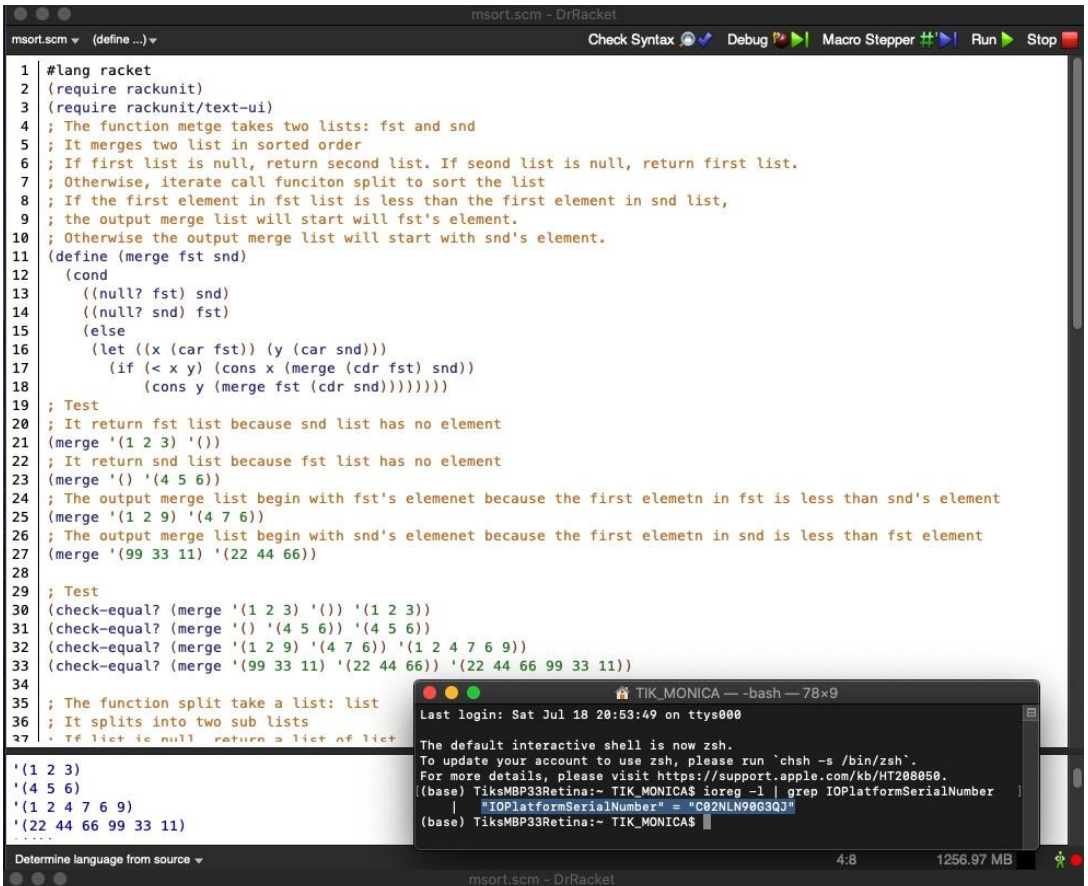
i.

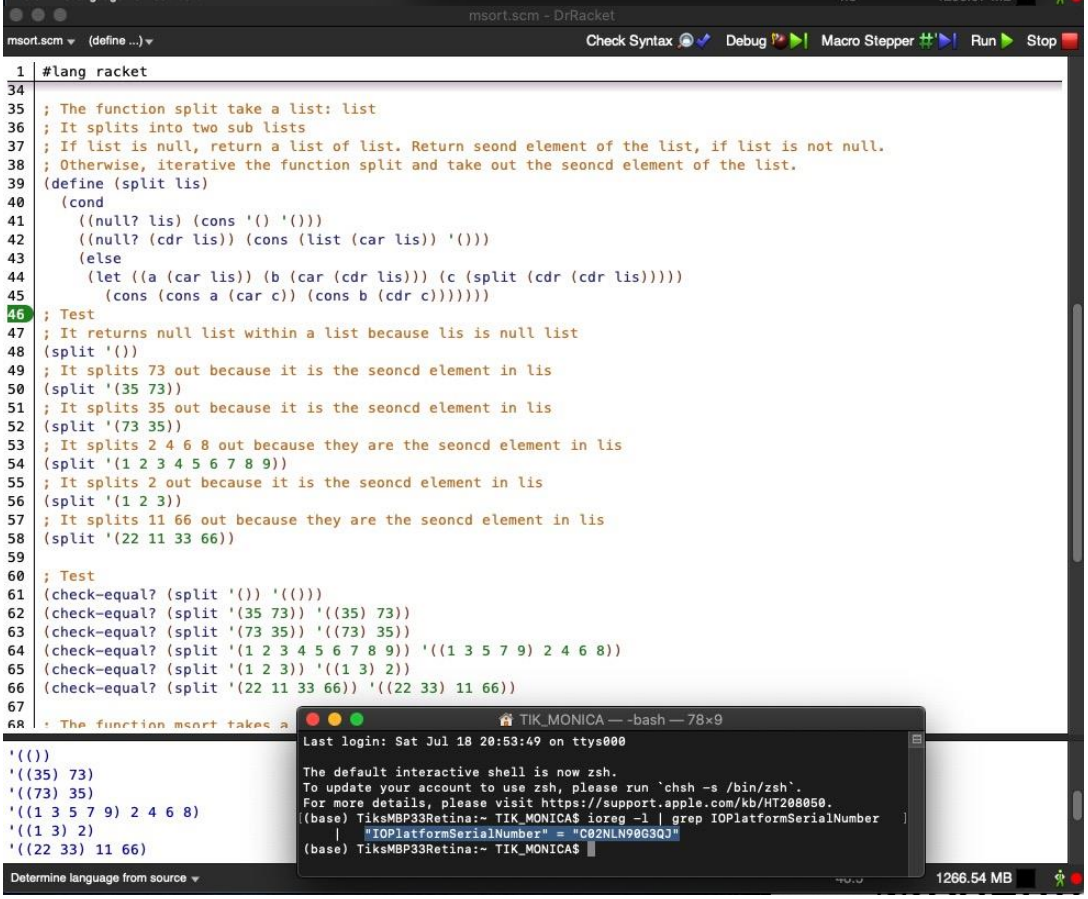


ii.

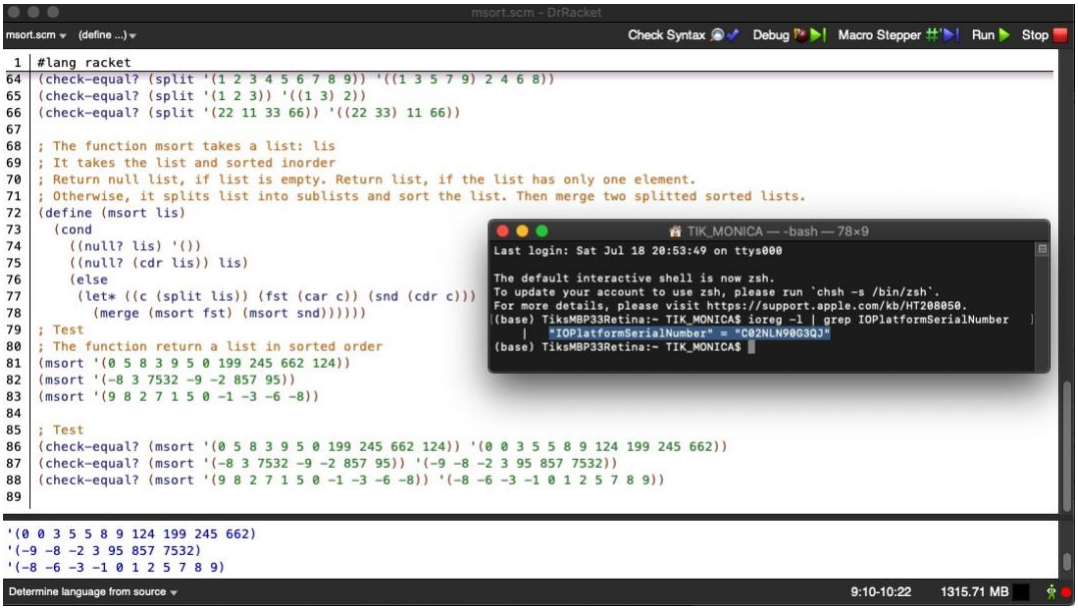


iii.



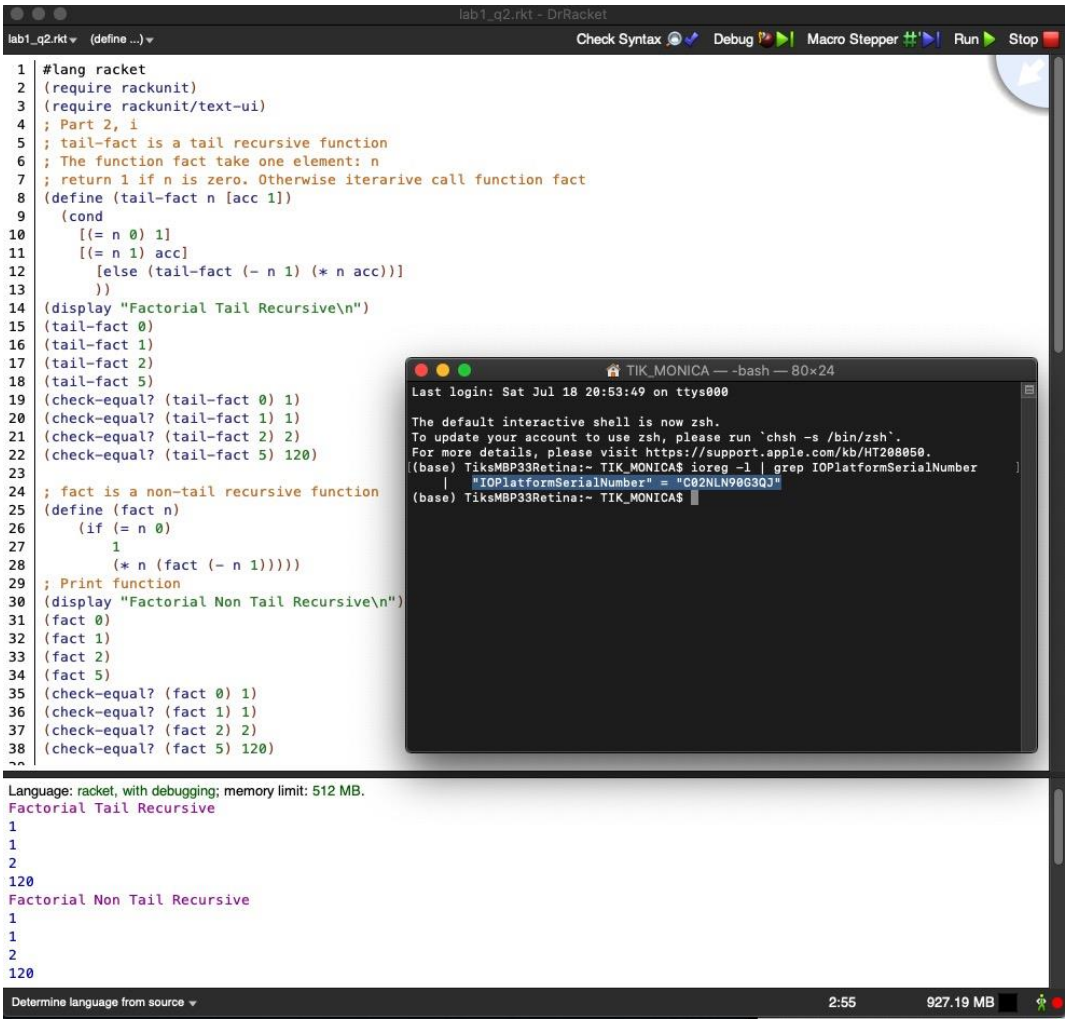


*(Continue)

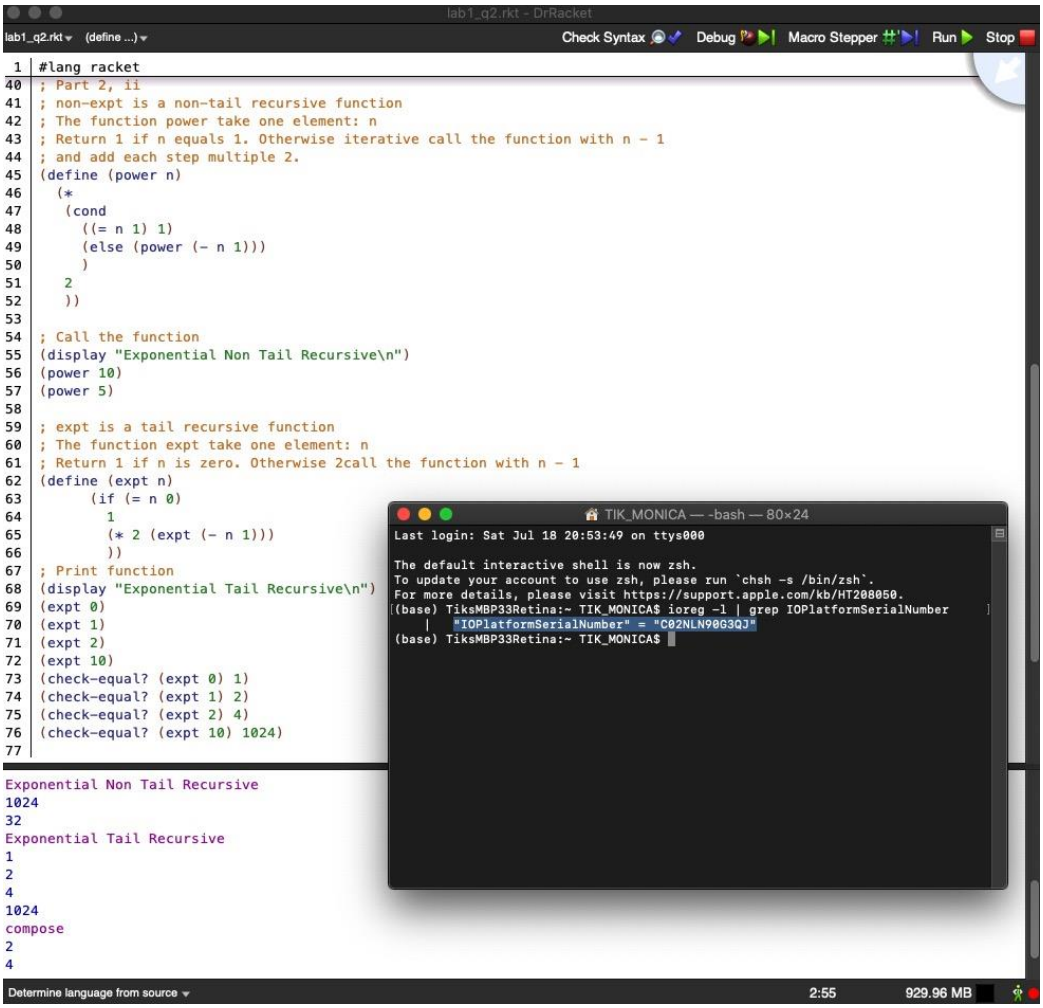

msort.scm - DrRacket
msort.scm (define ...)
Check Syntax
Debug
Macro Stepper
Run
Stop
1 #lang racket
64 (check-equal? (split '(1 2 3 4 5 6 7 8 9)) '((1 3 5 7 9) 2 4 6 8))
65 (check-equal? (split '(1 2 3)) '((1 3) 2))
66 (check-equal? (split '(22 11 33 66)) '((22 33) 11 66))
67
68 ; The function msort takes a list: lis
69 ; It takes the list and sorted inorder
70 ; Return null list, if list is empty. Return list, if the list has only one element.
71 ; Otherwise, it splits list into sublists and sort the list. Then merge two splitted sorted lists.
72 (define (msort lis)
73 (cond
74 ((null? lis) '())
75 ((null? (cdr lis)) lis)
76 (else
77 (let* ((c (split lis)) (fst (car c)) (snd (cdr c)))
78 (merge (msort fst) (msort snd))))))
79 ; Test
80 ; The function return a list in sorted order
81 (msort '(0 5 8 3 9 5 0 199 245 662 124))
82 (msort '(-8 3 7532 -9 -2 857 95))
83 (msort '(9 8 2 7 1 5 0 -1 -3 -6 -8))
84
85 ; Test
86 (check-equal? (msort '(0 5 8 3 9 5 0 199 245 662 124)) '(0 0 3 5 5 8 9 124 199 245 662))
87 (check-equal? (msort '(-8 3 7532 -9 -2 857 95)) '(-9 -8 -2 3 95 857 7532))
88 (check-equal? (msort '(9 8 2 7 1 5 0 -1 -3 -6 -8)) '(-8 -6 -3 -1 0 1 2 5 7 8 9))
89
TIK_MONICA — -bash — 78×9
Last login: Sat Jul 18 20:53:49 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) TiksMBP33Retina:~ TIK_MONICA$ ioreg -l | grep IOPlatformSerialNumber
| "IOPlatformSerialNumber" = "C02NLN90G3QJ"
(base) TiksMBP33Retina:~ TIK_MONICA$
'(0 0 3 5 5 8 9 124 199 245 662)
'(-9 -8 -2 3 95 857 7532)
'(-8 -6 -3 -1 0 1 2 5 7 8 9)
Determine language from source
9:10-10:22
1315.71 MB

2.

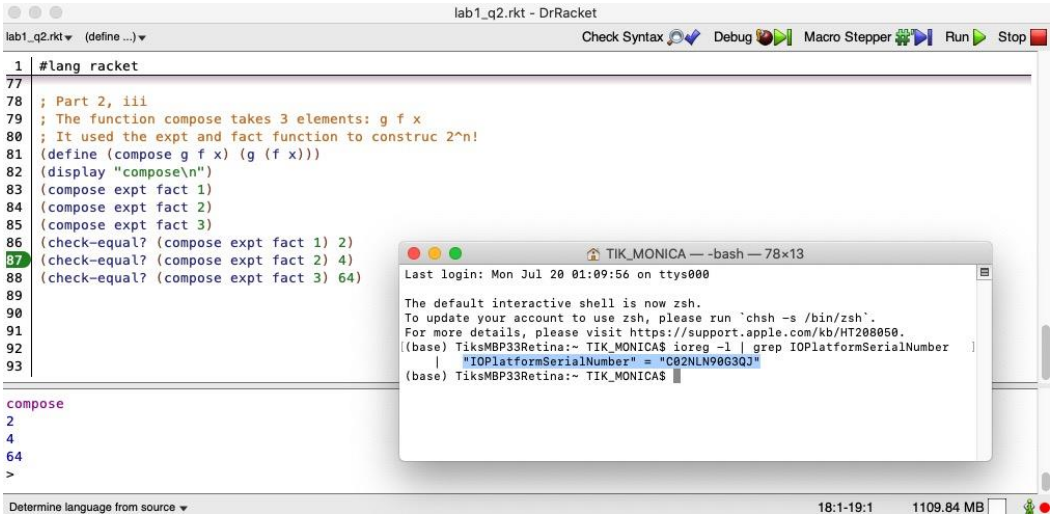
i.


lab1_q2.rkt - DrRacket
lab1_q2.rkt (define ...)
Check Syntax
Debug
Macro Stepper
Run
Stop
1 #lang racket
2 (require rackunit)
3 (require rackunit/text-ui)
4 ; Part 2, i
5 ; tail-fact is a tail recursive function
6 ; The function fact take one element: n
7 ; return 1 if n is zero. Otherwise iterarive call function fact
8 (define (tail-fact n [acc 1])
9 (cond
10 [(= n 0) 1]
11 [(= n 1) acc]
12 [else (tail-fact (- n 1) (* n acc))]
13))
14 (display "Factorial Tail Recursive\n")
15 (tail-fact 0)
16 (tail-fact 1)
17 (tail-fact 2)
18 (tail-fact 5)
19 (check-equal? (tail-fact 0) 1)
20 (check-equal? (tail-fact 1) 1)
21 (check-equal? (tail-fact 2) 2)
22 (check-equal? (tail-fact 5) 120)
23
24 ; fact is a non-tail recursive function
25 (define (fact n)
26 (if (= n 0)
27 1
28 (* n (fact (- n 1)))))
29 ; Print function
30 (display "Factorial Non Tail Recursive\n")
31 (fact 0)
32 (fact 1)
33 (fact 2)
34 (fact 5)
35 (check-equal? (fact 0) 1)
36 (check-equal? (fact 1) 1)
37 (check-equal? (fact 2) 2)
38 (check-equal? (fact 5) 120)
TIK_MONICA — -bash — 80×24
Last login: Sat Jul 18 20:53:49 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) TiksMBP33Retina:~ TIK_MONICA$ ioreg -l | grep IOPlatformSerialNumber
| "IOPlatformSerialNumber" = "C02NLN90G3QJ"
(base) TiksMBP33Retina:~ TIK_MONICA$
Language: racket, with debugging; memory limit: 512 MB.
Factorial Tail Recursive
1
1
2
120
Factorial Non Tail Recursive
1
1
2
120
Determine language from source
2:55
927.19 MB

ii.

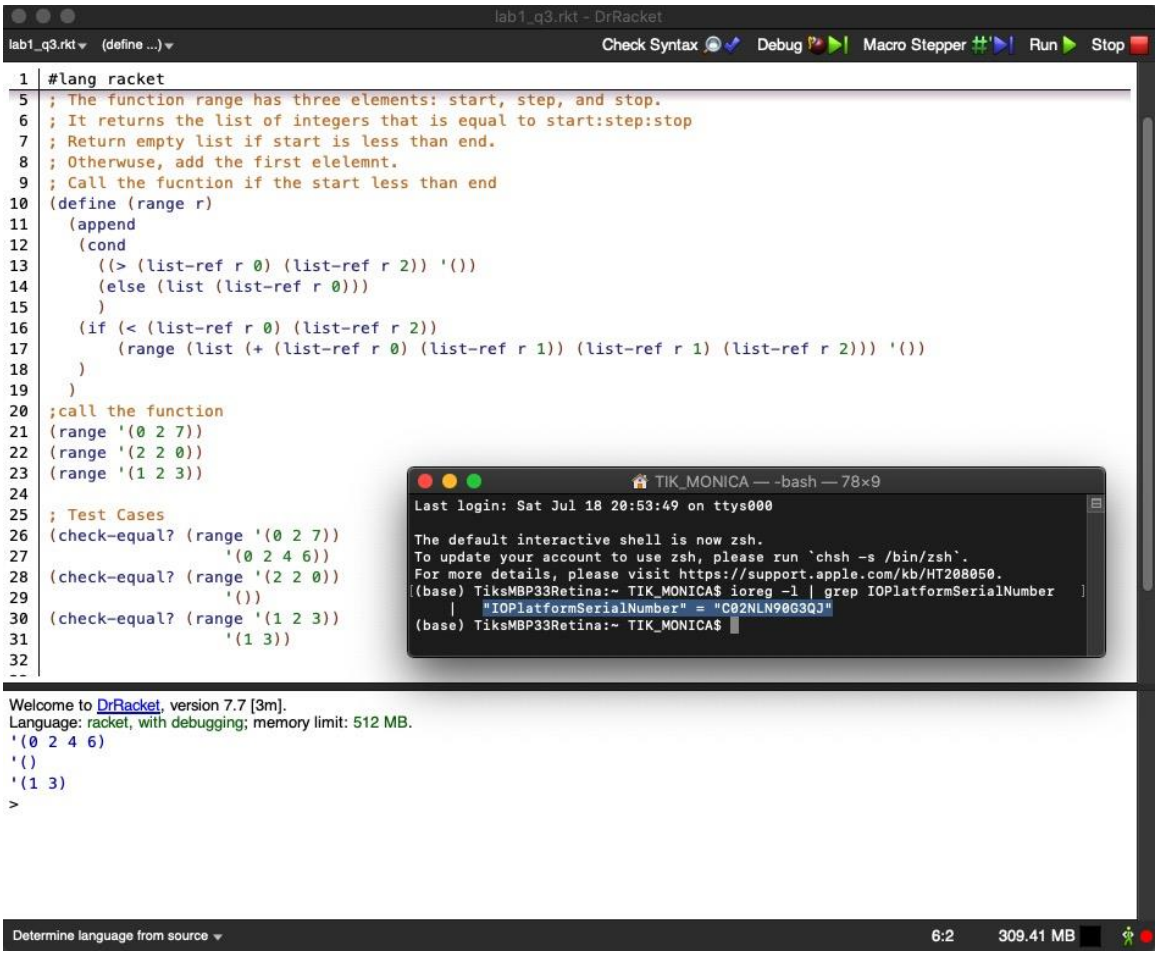

lab1_q2.rkt - DrRacket
lab1_q2.rkt (define ...)
Check Syntax Debug Macro Stepper Run Stop
#lang racket
; Part 2, ii
; non-expt is a non-tail recursive function
; The function power take one element: n
; Return 1 if n equals 1. Otherwise iterative call the function with n - 1
; and add each step multiple 2.
(define (power n)
(*
(cond
((= n 1) 1)
(else (power (- n 1)))
)
2
))
; Call the function
(display "Exponential Non Tail Recursive\n")
(power 10)
(power 5)
; expt is a tail recursive function
; The function expt take one element: n
; Return 1 if n is zero. Otherwise 2call the function with n - 1
(define (expt n)
(if (= n 0)
1
(* 2 (expt (- n 1)))
))
; Print function
(display "Exponential Tail Recursive\n")
(expt 0)
(expt 1)
(expt 2)
(expt 10)
(check-equal? (expt 0) 1)
(check-equal? (expt 1) 2)
(check-equal? (expt 2) 4)
(check-equal? (expt 10) 1024)
TIK_MONICA — -bash — 80×24
Last login: Sat Jul 18 20:53:49 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) TiksMBP33Retina:~ TIK_MONICA$ ioreg -l | grep IOPlatformSerialNumber
| "IOPlatformSerialNumber" = "C02NLN90G3QJ"
(base) TiksMBP33Retina:~ TIK_MONICA$
Exponential Non Tail Recursive
1024
32
Exponential Tail Recursive
1
2
4
1024
compose
2
4
Determine language from source
2:55
929.96 MB

iii.


lab1_q2.rkt - DrRacket
lab1_q2.rkt (define ...)
Check Syntax Debug Macro Stepper Run Stop
#lang racket
; Part 2, iii
; The function compose takes 3 elements: g f x
; It used the expt and fact function to construc 2^n!
(define (compose g f x) (g (f x)))
(display "compose\n")
(compose expt fact 1)
(compose expt fact 2)
(compose expt fact 3)
(check-equal? (compose expt fact 1) 2)
(check-equal? (compose expt fact 2) 4)
(check-equal? (compose expt fact 3) 64)
TIK_MONICA — -bash — 78×13
Last login: Mon Jul 20 01:09:56 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) TiksMBP33Retina:~ TIK_MONICA$ ioreg -l | grep IOPlatformSerialNumber
| "IOPlatformSerialNumber" = "C02NLN90G3QJ"
(base) TiksMBP33Retina:~ TIK_MONICA$
compose
2
4
64
>
Determine language from source
18:1-19:1
1109.84 MB

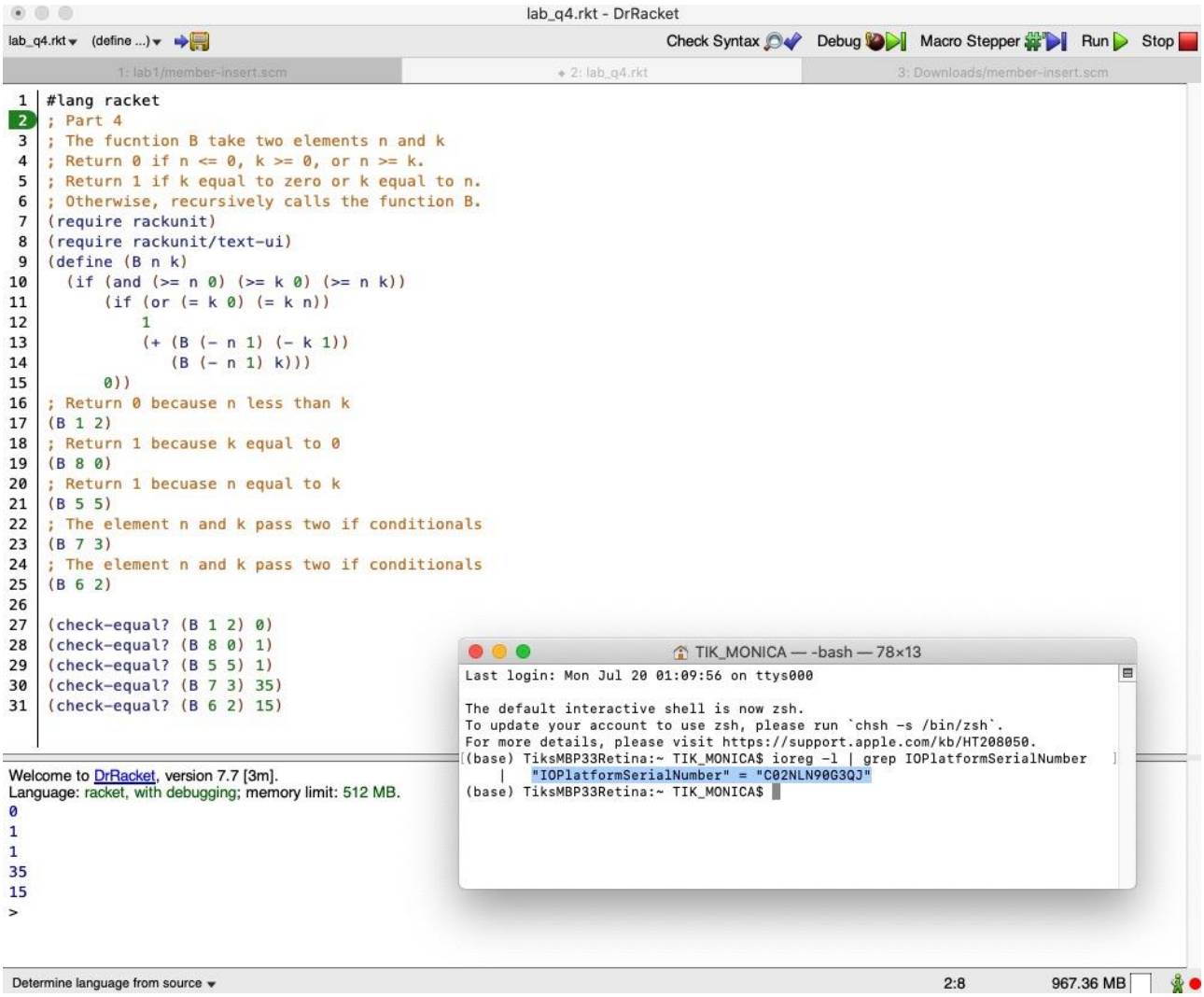
3. Part 3, i

i.



ii. Part 3, ii (Unable to complete)

4.


lab_q4.rkt - DrRacket
lab_q4.rkt
(define ...)
Check Syntax
Debug
Macro Stepper
Run
Stop
1: lab1/member-insert.scm
2: lab_q4.rkt
3: Downloads/member-insert.scm
#lang racket
; Part 4
; The fucntion B take two elements n and k
; Return 0 if n <= 0, k >= 0, or n >= k.
; Return 1 if k equal to zero or k equal to n.
; Otherwise, recursively calls the function B.
(require rackunit)
(require rackunit/text-ui)
(define (B n k)
(if (and (>= n 0) (>= k 0) (>= n k))
(if (or (= k 0) (= k n))
1
(+ (B (- n 1) (- k 1))
(B (- n 1) k)))
0))
; Return 0 because n less than k
(B 1 2)
; Return 1 because k equal to 0
(B 8 0)
; Return 1 becuase n equal to k
(B 5 5)
; The element n and k pass two if conditionals
(B 7 3)
; The element n and k pass two if conditionals
(B 6 2)
(check-equal? (B 1 2) 0)
(check-equal? (B 8 0) 1)
(check-equal? (B 5 5) 1)
(check-equal? (B 7 3) 35)
(check-equal? (B 6 2) 15)
TIK_MONICA — -bash — 78×13
Last login: Mon Jul 20 01:09:56 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) TiksMBP33Retina:~ TIK_MONICA$ ioreg -l | grep IOPlatformSerialNumber
| "IOPlatformSerialNumber" = "C02NLN90G3QJ"
(base) TiksMBP33Retina:~ TIK_MONICA$
Welcome to DrRacket, version 7.7 [3m].
Language: racket, with debugging; memory limit: 512 MB.
0
1
1
35
15
>
Determine language from source
2:8
967.36 MB