

Dennis George, Stephen Hansen, Shivanshi Nagar
CS360 Lab 1 Writeup
July 19, 2020

1. member

```
tux5: l1 > pwd
/home/djg365/cs360/l1
tux5: l1 > mit-scheme
MIT/GNU Scheme running under GNU/Linux
Type ^C (control-C) followed by ^H to obtain information about interrupts.

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Image saved on Thursday September 5, 2019 at 11:51:46 AM
Release 10.1.10 || Microcode 15.3 || Runtime 15.7 || SF 4.41 || LIAR/x86-64 4.118

1 ]=> (load "part1.scm")

;Loading "part1.scm"... done
;Value: msort

1 ]=> (member 0 '(1 2 3))

;Value: #f

1 ]=> (member 1 '(1 2 3))

;Value: #t

1 ]=> (member 0 '())

;Value: #f

1 ]=>
```

insert

```
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1 ]=> (load "part1.scm")

;Loading "part1.scm"... done
;Value: msort

1 ]=> (insert 1 '(2 3))

;Value: (1 2 3)

1 ]=> (insert 1 '(1 2 3))

;Value: (1 2 3)

1 ]=> (insert 1 '())

;Value: (1)

1 ]=>
```

maxmin

```
tux5: l1 > pwd
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1 ]=> (load "part1.scm")

;Loading "part1.scm"... done
;Value: msort

1 ]=> (maxmin '(1 2 3 4 5 6 7 8 9 10))

;Value: (10 1)

1 ]=> (maxmin '())

;Value: ()

1 ]=> (maxmin '(1 7 3 7 8 10 11 2 4 0))

;Value: (11 0)

1 ]=>
```

msort

```
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1 ]=> (load "part1.scm")

;Loading "part1.scm"... done
;Value: msort

1 ]=> (msort '())

;Value: ()

1 ]=> (msort '(3))

;Value: (3)

1 ]=> (msort '(9 8 7 6 5 4 3 2 1))

;Value: (1 2 3 4 5 6 7 8 9)

1 ]=> (msort '(1 2 3 4 5))

;Value: (1 2 3 4 5)

1 ]=> (msort '(3 5 6 2 4 6 7 1 10 9))

;Value: (1 2 3 4 5 6 6 7 9 10)

1 ]=>
```

2. Non-tail n!

```
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1 ]=> (load "part2.scm")

;Loading "part2.scm"... done
;Value: exponential-factorial-tail

1 ]=> (factorial-notail 5)

;Value: 120

1 ]=> (factorial-notail 1)

;Value: 1

1 ]=> (factorial-notail 10)

;Value: 3628800

1 ]=>
```

Tail n!

```
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1 ]=> (load "part2.scm")

;Loading "part2.scm"... done
;Value: exponential-factorial-tail

1 ]=> (factorial-tail 5)

;Value: 120

1 ]=> (factorial-tail 1)

;Value: 1

1 ]=> (factorial-tail 10)

;Value: 3628800

1 ]=> |
```

Non-tail 2^n

```
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1 ]=> (load "part2.scm")

;Loading "part2.scm"... done
;Value: exponential-factorial-tail

1 ]=> (exponential-notail 5)

;Value: 32

1 ]=> (exponential-notail 1)

;Value: 2

1 ]=> (exponential-notail 10)

;Value: 1024

1 ]=> (exponential-notail 20)

;Value: 1048576

1 ]=> |
```

Tail 2^n

```
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;Value: exponential-factorial-tail

1 ]=> (exponential-tail 5)

;Value: 32

1 ]=> (exponential-tail 1)

;Value: 2

1 ]=> (exponential-tail 10)

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1 ]=> (exponential-tail 20)

;Value: 1048576

1 ]=>
```

Non-tail $2^{(n!)}$

```
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1 ]=> (load "part2.scm")

;Loading "part2.scm"... done
;Value: exponential-factorial-tail

1 ]=> (exponential-factorial-notail 1)

;Value: 2

1 ]=> (exponential-factorial-notail 4)

;Value: 16777216

1 ]=> (exponential-factorial-notail 3)

;Value: 64

1 ]=>
```

Tail $2^{(n!)}$

```
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;Loading "part2.scm"... done
;Value: exponential-factorial-tail

1 ]=> (exponential-factorial-tail 1)

;Value: 2

1 ]=> (exponential-factorial-tail 4)

;Value: 16777216

1 ]=> (exponential-factorial-tail 3)

;Value: 64

1 ]=>
```

3. (i)

```
tux8: l1 > pwd
/home/djg365/cs360/l1
tux8: l1 > mit-scheme
MIT/GNU Scheme running under GNU/Linux
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1 ]=> (load "part3.scm")

;Loading "part3.scm"... done
;Value: seq-nomap

1 ]=> (range '(0 2 7))

;Value: (0 2 4 6)

1 ]=> (range '(3 3 1))

;Value: ()

1 ]=> (range '(0 1 10))

;Value: (0 1 2 3 4 5 6 7 8 9 10)

1 ]=> (range '(1 2 10))

;Value: (1 3 5 7 9)

1 ]=> (range '(2 2 0))

;Value: ()

1 ]=> |
```

(ii)

```
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1 ]=> (load "part3.scm")

;Loading "part3.scm"... done
;Value: seq-nomap

1 ]=> (seq (lambda (x) (* x x)) '(0 2 7))

;Value: (0 4 16 36)

1 ]=> (seq-nomap (lambda (x) (* x x)) '(0 2 7))

;Value: (0 4 16 36)

1 ]=> (seq (lambda (x) (+ x x)) '(5 1 1))

;Value: ()

1 ]=> (seq-nomap (lambda (x) (+ x x)) '(5 1 1))

;Value: ()

1 ]=> (seq (lambda (x) (+ x x)) '(0 1 10))

;Value: (0 2 4 6 8 10 12 14 16 18 20)

1 ]=> (seq-nomap (lambda (x) (+ x x)) '(0 1 10))

;Value: (0 2 4 6 8 10 12 14 16 18 20)

1 ]=>
```

4. In the attached .zip file, there is an attempt at the extra credit problem for computing binomial coefficients.

Lab Problems

Problem	Degree
1	3
2	3
3	3
4	3