Scheme Notes 04

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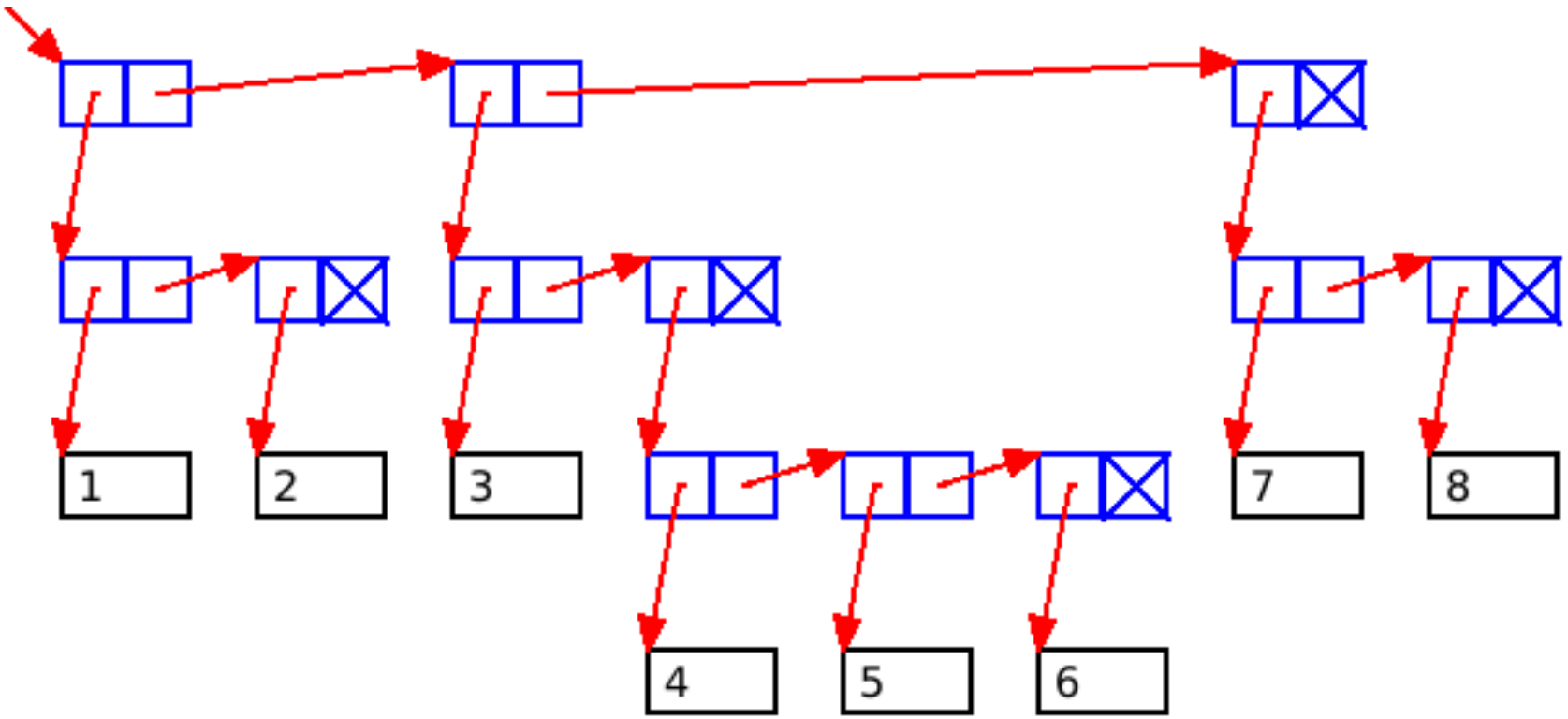
Trees

```
(define tree1 (cons (list 1 2) (list 3 4)))

(define tree2 (list (list 1 2)
                    (list 3
                          (list 4 5 6))
                    (list 7 8)))
```

- Run `boxarrow.rkt` for pictures.



count-leaves

count-leaves

```
(define (count-leaves tree)
  (cond ((empty? tree) 0)
        ((not (pair? tree)) 1)
        (else (+ (count-leaves (car tree))
                 (count-leaves (cdr tree))))))
```

fringe

fringe

```
(define (fringe tree)
  (cond ((empty? tree) '())
        ((not (pair? tree)) (list tree))
        (else (append (fringe (car tree))
                      (fringe (cdr tree))))))
```

sum-fringe

sum-fringe

```
(define (sum-fringe tree)
  (cond ((empty? tree) 0)
        ((number? tree) tree)
        (else (+ (sum-fringe (car tree))
                 (sum-fringe (cdr tree))))))
```

map-tree

map-tree

```
(define (map-tree tree op)
  (cond ((empty? tree) '())
        ((number? tree) (op tree))
        (else (cons (map-tree (car tree) op)
                    (map-tree (cdr tree) op)))))
```

scale-tree using map-tree

scale-tree using map-tree

```
(define (scale-tree tree factor)
  (map-tree tree (lambda (x) (* x factor))))
```

increment-tree using map-tree

increment-tree using map-tree

```
(define (increment-tree tree)
  (map-tree tree inc))
```

Apply

```
(+ 1 2 3 4 5)                  =>  15
(+ (list 1 2 3 4 5))           =>  error
(apply + (list 1 2 3 4 5))     =>  15
```