Solutions to Sample Quiz 1

Problem 1

11
error (arguments passed in wrong order)
36

Problem 2

Applicative order: Evaluate all subexpressions first, then apply the first to the rest. (Scheme uses this.)

Normal order: No arguments are evaluated until they are needed. Fully expand, then reduce.

In Scheme (applicative order), the following two items could be printed:
  one two plus
  two one plus

In normal-order Scheme, the following two items could be printed:
  plus one two
  plus two one

Problem 3

(caddr first-list)
(caadr second-list)

Problem 4

(define (merge list1 list2)
  (cond ((null? list1) list2)
        ((null? list2) list1)
        ((= (car list1) (car list2))
         (cons (car list1)
               (merge (cdr list1) (cdr list2))))
        ((< (car list1) (car list2))
         (cons (car list1)
               (merge (cdr list1) list2)))
        (else (cons (car list2) (merge list1 (cdr list2)))))

Time: \(\Theta(n)\)
Space: \(\Theta(n)\)
n is dependent upon the size of the longer list
Recursive process

Problem 5

(define (apply-twice f)
  (lambda (x) (f (f x)))))
Problem 6

(define (item-name item)
  (caar item))

(define (item-value item)
  (cdar item))

(define (item-condition item)
  (cadr item))

(define first-item car)

(define rest-items cdr)

(define (total-value item-list)
  (if (null? item-list)
      0
      (+ (item-value (first-item item-list))
          (total-value (rest-items item-list)))))

Time: $\Theta(n)$
Space: $\Theta(n)$
$n$ is dependent upon the length of the list of items
Recursive process

Problem 7

(define (car z)
  (z 'car))

(define (cdr z)
  (z 'cdr))