**Principles of Programming Languages**

Assignments 2

1. special form (define, if, etc) are not evaluated when primitive operators are evaluated to their pre-defined denoted value.   
   example: (define size 6) the ‘size’ parameter is evaluated to 6.
2. (+ (+ 1 2) (+ 3 4)), (> 1 (+ 2 3)).
3. No!
4. No!
5. L3:
   1. Map – parallel
   2. Reduce – sequential
   3. Filter – parallel
   4. All – parallel / sequential
   5. Compose - sequential
6. Value – 3 + 4 + 5 = 12,

Question 2:

Q. 2.1 –

; Signature: append(lst1, lst2)

; Type:[List \* List -> List]

; Purpose: gets two lists and returns their concatenation

; Pre-conditions: lst1 is a list, lst2 is a list

; Tests: (append ‘(1 2) ‘(#t 4)) → ‘(1 2 #t 4)

Q. 2.2 –

; Signature: reverse(lst)

; Type:[List -> List]

; Purpose: gets a list and reverses it

; Pre-conditions: lst is a list

; Tests: (reverse ‘(1 2 #t 4)) → ‘(4 #t 2 1)

Q. 2.3 –

; Signature: duplicate-items(lst1, lst2)

; Type:[List \* List(Number) -> List]

; Purpose: gets two lists – *lst1* , *lst2* - and duplicates each item of *lst1* according to the number defined in the same position in *lst2*

; Pre-conditions: lst1 is a list, lst2 is a list of numbers

; Tests: ((duplicate-items '(1 2 3) '(2 1 0 10 2))→ '(1 1 2)

Q. 2.4 –

; Signature: payment(sum, lst)

; Type:[Number \* List(Number) -> Number]

; Purpose: gets a sum of money and list of available coins, and returns the number of possible ways to pay the money with these coins

; Pre-conditions: sum >= 0, lst is a list of numbers

; Tests: (payment 5 ‘(1 1 1 2 2 5 10)) → 3

Q. 2.5 –

; Signature: compose-n(f, n)

; Type:[(T->T) \* Number -> T]

; Purpose: gets an unary function *f* and a number *n* and returns the closure of the n-th self-composition of f

; Pre-conditions: f is an unary function ,n > 0

; Tests: (define mul8 (compose-n (lambda (x) (\* 2 x)) 3)) (mul8 3) → 24