CPSC 3740 – Fall 2022
Assignment 4 (Part B)
Due: Nov. 30 (Wednesday) 11:55pm
(The total is 20 marks)

Please note that due to the potential COVID situation, the requirements of this assignment might be changed and also the compilation and submission procedure might be changed. You will be notified should such a situation arise.

Notes:
(*) Please note that no collaboration is allowed for this assignment. Should any plagiarism be identified, all the involved students will get zero for the assignment and will be reported to the Chair of the department for further action. The marker has been asked to check your submissions carefully.

(*) Late submission policy: 1 day late: 5% off, 2 days late: 10% off, more than 2 days late: you will get 0 for the assignment.

(*) Access the following website and see what it tells you about Dr. Racket and the programming language Scheme.

http://docs.racket-lang.org/guide/index.html

Please use R5RS language in Dr. Racket.

Questions:

(1) (5 marks) Write a function called *deletedup* that take a list numbers. If the list contains duplicates of a number, it deletes the duplicates and only keeps the first copy of the number. The function will return the resultant list. For instance, deletedup '(1 3 5 4 6 4 5 7)) will return (1 3 5 4 6 7). Please only use those basic list manipulation functions, such as car, cdr, etc.

(2) (4 marks) You are given a list of elements, each of which could be a list. One example is ((a b) e (c d)). Create a function, called *dreverse*, to reverse the elements *recursively*. For the example, (dreverse '((a b) e (c d))) will return ((d c) e (b a)). Please just use those basic list manipulation functions, such as car, cdr, etc.

(3) (4 marks) Continue from Question (2) in Assignment 3 Part B, where we traverse a complete binary tree in the inorder.

Now write a function, called *preorder*, to traverse a complete binary tree using the so-called preorder, which is: *recursively* starting from a node, first visit the node, then preorder traverse the left child, and finally preorder traverse the right child. For the example of the tree (*a* (*b* (*d) (e*)) (*c* (*f*) (*g*))), the preorder traversal result is a list (*a b d e c* *f g*). You need to use recursion to solve the problem. Please only use those basic list manipulation functions, such as car, cdr, etc.

(4) (7 marks) Continue from Question (3) above. Write a function, called *tcons*, which, given a complete binary tree's preorder traversal and inorder traversal, reconstructs the complete binary tree itself.

For example, given (*a b d e c f g*) and (*d b e a f c g*), *tcons* outputs a list (*a* (*b* (*d*) (*e*)) (*c* (*f*) (*g*))), representing the complete binary tree in the above example.

Please only use those basic list manipulation functions, such as car, cdr, etc.

Submission:

Your solution should follow the format below.

```
; Answer to (1)
(define  (deletedup …...)

; Answer to (2)
(define (dreverse……)

; Answer to (3)
(define (preorder ……)

; Answer to (4)
(define (tcons……)
```

The file to be saved for your answers should be called *YourLastName*.rkt. Submit it on the Moodle. The marker will call the above functions to examine your solution.