

CIS-280
Homework 5: Operations on Sequences and Trees
Due Tuesday, March 22
60 points

1. (10 points) Design a procedure (`CountElt elt l1`) that takes as arguments an atomic element `elt` and a sequence `l1` (a simple list with no embedded sublists) and returns a count of the number of times that `elt` appears in `l1`. For example

```
(CountElt 3 '(5 3 6 5 3 6 3 4 9 3)) returns 4
(CountElt 'a '(5 4 a 3 2 a b)) returns 2
```

Make sure that you recognize the time complexity of your procedure `CountElt`.

2. (10 points) Design a procedure (`PairsDiff l1 l2`) that takes as arguments two sequences `l1` and `l2` (simple lists with no embedded sublists) of integers and returns a list of sublists containing the corresponding elements of `l1` and `l2` that are not equal. You may assume that the argument lists are the same length. For example,

```
(PairsDiff '(5 8 2 4 1 3) '(4 8 9 6 1 2) )
returns ( (5 4) (2 9) (4 6) (3 2) )
```

Make sure you recognize the time complexity of your procedure `PairsDiff`.

3. (10 points) Design a procedure (`Filter l1 p`) that takes as arguments a sequence `l1` (simple list with no embedded lists) of integers and a predicate `p` and returns the list with only those integers satisfying the predicate `p` remaining. For example,

```
(Filter '(13 54 90 15 6 36 88) (lambda(x)(< x 20)) ) returns (13 15 6)
```

4. (15 points) Design a procedure (`CountSubtrees l1`) that takes as argument a tree `l1` (a complex list whose elements are not necessarily atomic) and returns a count of the number of subtrees (ie., the embedded lists at any depth). For example,

```
(CountSubtrees '(4 2 (5) (a (4 (3) 2 (4 b)) 7) (6 2))) returns 6
```

5. (15 points) Design a procedure (`RemoveEven l1`) that takes as argument a tree of integers `l1` (a complex list whose elements are not necessarily atomic), and returns the list with all instances of numbers that are even removed from the list. For example,

```
(RemoveEven '(19 33 6 (65 88 (33 69 76 61 10) ) (75 42) (44 67 (8) 33) ) )
returns (19 33 (65 (33 69 61)) (75) (67 ( ) 33) )
```

Submit your code for the above procedures on the electronic submission system for Homework-5.