CSE505 – Spring 2021

Assignment 2 – Problem 3

(to be done by the same team as for Problems 1 and 2)

Due Date: **Sunday, March 28** (11:59 pm, online submission)

3 Convert the following recursive definitions into tail-recursive definitions.

a. fun f(1) = 1
   | f(n) = n*n + f(n-1); (* assume n > 1 *)

   Name the tail-recursive function as f2.

b. fun flatten([ ]) = [ ]
   | flatten(h::t) = h @ flatten(t);

   Name the tail-recursive function as flatten2.

c. datatype 'a tree = leaf of 'a | node of 'a tree * 'a tree;

   fun cat(leaf(s)) = s
   | cat(node(t1, t2)) = cat(t1) ^ " " ^ cat(t2);

   Name the tail-recursive function as cat2.

How to run ML on Timberlake (you may also install and run ML on your personal computer)

Place all function definitions in one file, called A2_Problem3.sml. Run the program as follows.

timberlake% /util/bin/sml A2_Problem3.sml

- f(5);
- f2(5); (* should give same answer as f(5) *)
-
- flatten([[1,2], [3,4,5], [ ], [6,7,8]]);
- flatten2([[1,2], [3,4,5], [ ], [6,7,8]]); (* should give same answer as flatten *)
-
- *… similarly test cat and cat2 - use the tree shown in Lecture 14 slide 15 …*
- *Ctrl-d to exit*

What to Submit

Prepare a top-level directory named A2_Problem3_UBITId1_UBITId2 if the assignment was done by two students (list UBITId's in alphabetic order); otherwise, name it as A2_Problem3_UBITId if the assignment was done solo. In this directory place the file A2_Problem3.sml.
Compress the directory and submit the compressed file using the online submission procedure – instructions posted at Resources → Assignments → Online_Submission.pdf. Only one submission per team is required.

End of Assignment 2 Problem 3