Homework 3

September 26, 2018

1 Introduction

For this homework, you will implement some SML functions using list and tuple data structures.

1. You may reuse any functions you have already defined for a previous question.
2. Your solution should be a working ML program in a text file that I can run on a console using command like `use "hwk3.sml";`
3. You may add comments to your program such as `(* Question 1 *)`.
4. Some of these functions involve recursion.

2 Questions

1. Write a function `plus` that adds two complex numbers, where a complex number is written as a tuple of two integers. For example, $(1, 2)$ is a complex number with real part 1 and imaginary part 2.

   `plus ((1, 2), (3, 4))` should return `(4, 6)`.

2. Write a function `times` that multiples two complex numbers. For example, `times ((1,2), (3,4))` should return `(1 * 3 - 2 * 4, 1 * 4 + 2 * 3)`, which is `(~5, 10,)`.

3. Write a function `until` that takes two integers `x` and `y` and return a list from `x` to `y - 1`. If $x \geq y$, it should return nil. For example, `until (1, 4)` should return `[1,2,3]`.

4. Write a function `append` that takes an integer x and a list of integers and return a list of pairs where the left of each pair is x and right of each pair is a list element. For example, `append (1, [1, 2, 3])` should return `[(1,1), (1,2), (1, 3)]`.

5. Write a function `pair` that takes two lists of integers and generates a list of pairs, where each pair is a combination of each element from each list. For example, `pair ([1,2], [3,4,5])` should return

   `[(1,3), (1,4), (1,5), (2,3), (2,4), (2,5)]`.

3 Submission

Please write your solution in a text file by the name of `hwk3.sml` and submit it to the dropbox.