Assignment 5 (in class), TCSS 480 Winter 2016
Due: Feb. 2, 2016, 19:25

OBJECTIVE

The objective of this assignment is to practice basic ML concepts such as tuples, lists, functions, and recursion.

ASSIGNMENT SUBMISSION

You are to work with a partner of your choosing and show your code to the instructor at the end of the class. If your pair works out of 2 computers, then the instructor will select which person is to show and explain the code for the pair.

DESCRIPTION OF ASSIGNMENT

Create one file for all the functions listed below and name it `day9.sml`. Since there are 8 functions to be written, you have about 15 minutes to write each function to get full credit for this assignment (each function is worth 1.25 pts). When writing your functions, you are NOT allowed to use built-in list library functions other than `null, hd, tl`. Do not attempt to set up local variables or loops – use recursion for repetitive tasks. Use the test file provided with this assignment to test your solutions – run the test file in REPL rather than the solutions file. The file is named `day9tests.sml`. Download it from `Canvas`, and use it.

1. Write function `roots` that that takes 3 coefficients of a quadratic equation (a, b, c of $ax^2 + b x + c = 0$) as a tuple and returns two roots of the equation as a tuple. Do not try to set up local variables – instead, simply create a tuple with two equations – the first equation will evaluate to the first root and the second equation will evaluate to the second root. Use function `Math.sqrt()` in the equations. Assume real roots exist.
2. Write a function `isYounger` that takes two dates (each date is a 3-int tuple dd, mm, yyyy) and evaluates to true or false. It evaluates to true if the first argument is a date that comes after the second argument. (If the two dates are the same, the result is false.)
3. Write a function `length` that takes a list of ints and returns its length.
4. Write a function `getnth` that takes a list of strings and an int `n` and returns the nth element of the list, where the head of the list is the 1st element. If the list is empty or `n` is invalid, return "no such element".
5. Write a function `generate` that takes two ints as arguments and generates a list of integers from arg1 to arg2 (inclusive), e .g. if arg1 = 3 and arg2 = 6, then the function returns [3, 4, 5, 6]. If arg1 > arg2, return an empty list.
6. Write a function `numberInMonth` that takes a list of dates (a list of tuples, where each tuple is organized as dd, mm, yyyy) and an int signifying a month and returns how many dates in the list match the given month.
7. Write a function `datesInMonth` that takes a list of dates (a list of tuples, where each tuple is organized as dd, mm, yyyy) and an int signifying a month, and returns a list holding only the dates that match the given month. The returned list should contain dates in the order they were originally given.
8. Write a function `repeat` that takes a list of integers and a list of nonnegative integers and returns a list that repeats the integers in the first list according to the numbers indicated by the second list.