2024-09-19 / Programming Language Theory / Shin Hong

Scala Functional Programming Exercise 1

1. Write function `nsols` that receives three integers a, b, c and determines the number of solutions of the equation $ax^2 + bx + c = 0$.

2. Write recursive function `min` that uses tail recursion to find the least value in the given list of integers (assume that the given list is non-empty).

3. Write recursive function `desc` that receives a positive integer n, and returns the list of n numbers from n to 1 in descending order.

4. Write recursive function `get_elem` that receives a list of integers, L, and a non-negative integer i, and generate a list containing the integer at the i-th index in L if exists; otherwise, empty list.

5. Write recursive function `merge_list` that receives two ascending list of integers and generates the merged ascending list.

6. Write recursive function `bin_search` that receives a monotonic function `p : Int => Boolean`, and two integers `low` and `high` which indicate the upper bound and lower bound of the search, and then find the first least `x` in between `low` and `high` such that `p(x)` is true.

   (inspired by Problem 6 at https://ics-websites.science.uu.nl/docs/vakken/fp/2023/exercises/basics.html)