CS 346 – Declarative Programming
Assignment 1
Due Date: March 28, 2022

Q1. Write a function that takes the length of three sides of a triangle (a, b and c) (real values, assume positive) and finds its area using heron's formula:

Area= $\sqrt{s(s-a)(s-b)(s-c)}$ where s equals (a+b+c)/2.

You must compute the value of s just once (Hint: Use let).
However, before computing the area, you must check whether the 3 input values represent a triangle or not. Use this Rule:
Three values represent a triangle if the sum of every two values is greater than the third one.
For example: The three values: 5.0, 13.75 and 6.5 don't represent a triangle (because 5.0 + 6.5 is not greater than 13.75). In such cases: raise a exception.

Q2. A proper divisor of a natural number is the divisor that is strictly less than the number. For example, 9 has 2 proper divisors: 1, 3, and the divisor summation is: 1 + 3 = 4.

Numbers where this summation is less than the number itself are called deficient. 9 is an example of a deficient number.

Write a function that takes two integers A and B, and returns how many deficient numbers in the range [A,B] inclusively.

Q3. Suppose that we will represent integers by a list of the reverse of the digits of these integers. (Example 2854 → [4,5,8,2])

a) Write a function that takes an integer and returns its list representation and write another function that takes the list representation and returns the equivalent integer.

b) Write two versions of the function sum that takes two integers (in list representation) and returns their sum (in list representation also).

   The first version: "sum1" converts the two list representations to integers, adds them and finally converts the result back to list representation.

   The second version: "sum2" adds the two list representations directly.

Q4.

a) Write a function that takes a sorted list of integers and removes the duplicates in that list. (Example: remove([4,6,6,8,9,9,9,12]) = [4,6,8,9,12])

b) Write a function that inserts an integer in its proper position in an ascendingly sorted list.

c) Write a function that sorts an integer list using insertion sort.

d) Write a function that takes a list of integers and returns the list after sorting it and removing its duplicates.