Haskell — Computations (2) P68540_en

These problems are inspired in some of the problems from Project Euler. You can find them at https://projecteuler.net.

1. The sum of the squares of the first 10 natural numbers is $1^2 + 2^2 + \cdots + 10^2 = 385$. The square of the sum of the first 10 natural numbers is $(1 + 2 + \cdots + 10)^2 = 55^2 = 3025$. Therefore, the difference between the sum of the squares of the first 10 natural numbers and the square of the sum of the first 10 natural numbers is $3025 - 385 = 2640$.

   Write a function *diffSqrs* :: **Integer** → **Integer** that, given a natural n, returns the difference between the sum of the squares of the first n natural numbers and the square of the sum of the first n natural numbers.

2. A Pythagorean triplet are three natural numbers (a, b, c) such that $a^2 + b^2 = c^2$. Write a function *pythagoreanTriplets* :: **Int** → [(**Int**, **Int**, **Int**)] that, given a natural $n \geq 1$, returns the list of all Pythagorean tripletes that add up to n. Each triplet must be sorted in such a way that $a \leq b \leq c$ and the list must be sorted according to a.

3. Write a function *tartaglia* :: [[**Integer**]] that returns an infinite list with the rowss of the Tartaglia's triangle (also known as Pascal's triangle).

4. Write a function *sumDigits* :: **Integer** → **Integer** that returns the sum of all digits of a natural number. Use high order functions rather than recursion.

5. Write a function *digitalRoot* :: **Integer** → **Integer** that returns the digital root of a natural number. Use high order functions rather than recursion.

Scoring

Each function scores 20 points.

Sample input 1

```
diffSqrs 10
map pythagoreanTriplets [3,12,84]
take 5 tartaglia
sumDigits 32768
digitalRoot 65536
```

Sample output 1

```
2640
[[],[(3,4,5)],[(12,35,37),(21,28,35)]]
[[1],[1,1],[1,2,1],[1,3,3,1],[1,4,6,4,1]]
26
7
```

Problem information

Author: Jordi Petit
Translator: Jordi Petit

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