
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 $1^2 + 2^2 + \dots + 10^2 = 385$. The square of the sum of the first 10 natural numbers is $(1 + 2 + \dots + 10)^2 = 55^2 = 3025$. 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 triplets 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 rows 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

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

Sample output

```
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

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