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## Haskell — Computations (2)

P68540\_en

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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],[1,2,1],[1,3,3,1],[1,4,6,4,1]]
26
7
```

### Problem information

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