1 Problem

Let $d(n)$ be defined as the sum of proper divisors of n (numbers less than n which divide evenly into n). If $d(a) = b$ and $d(b) = a$, where $a \neq b$, then a and b are an amicable pair and each of a and b are called amicable numbers.

For example, the proper divisors of 220 are $1, 2, 4, 5, 10, 11, 20, 22, 44, 55$ and 110; therefore $d(220) = 284$. The proper divisors of 284 are $1, 2, 4, 71$ and 142; so $d(284) = 220$.

Evaluate the sum of all the amicable numbers under 10000.

2 Solution

```
import Data.Numbers
import Data.List

sumPropDivs :: Integer → Integer
sumPropDivs x = sum $ filter (<x) (factors x)

pdList = map (sumPropDivs) [0..10000]

allPairs = filter (λ(x, y) → x ≢ y) $ intersect list1 list2
  where list1 = zip pdList [0..10000]
        list2 = zip [0..10000] pdList

sumAmicable = (sum ∘ fst ∘ unzip) allPairs

main = do
  putStrLn $ "The sum of all amicable numbers under 10000 is " ++ show sumAmicable ++ "."
```

3 Result

```
*Main GOA Data.List> :main
The sum of all amicable numbers under 10000 is 31626.
it :: ()
```