

1 Problem

The first two consecutive numbers to have two distinct prime factors are:

$$14 = 2 \times 7$$

$$15 = 3 \times 5$$

The first three consecutive numbers to have three distinct prime factors are:

$$644 = 2^2 \times 7 \times 23645 = 3 \times 5 \times 43646 = 2 \times 17 \times 19.$$

Find the first four consecutive integers to have four distinct primes factors.
What is the first of these numbers?

2 Solution

```
import Data.List
import qualified Data.Map as Map
import Data.Maybe
import System.Environment
import Data.Numbers
import Data.Numbers.Primes
import qualified Data.Set as Set

dPrimeFactors n = Set.fromList $ primeFactors n
dPFList n = [(k, dPrimeFactors k) | k <- filter (\z -> (¬ $ isPrime z)) [1..n]]
nConsec n s =
  let dpf = dPFList s
      fltrd = filter (\z -> Set.size (snd z) == n) dpf
      gps = [take (fromIntegral n) (drop (fromIntegral k) fltrd) | k <- [0..(length fltrd - n)]]
      gps2 = filter (\z -> isConsec (map fst z)) gps
      gps3 = filter (\zz -> Set.empty == foldl (\acc z -> Set.intersection acc (snd z)) (snd (head zz)) zz) gps2
  in gps3
isConsec xs = (sort xs) == [(minimum xs)..(maximum xs)]
main = do
  let soln = (fst o head o head) $ nConsec 4 20000
  putStrLn $ show soln
```

3 Result

```
runhaskell problem47.1hs
134043
```