

1 Problem

We shall say that an n -digit number is pandigital if it makes use of all the digits 1 to n exactly once. For example, 2143 is a 4-digit pandigital and is also prime.

What is the largest n -digit pandigital prime that exists?

2 Solution

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

rPrimes :: Integer → [Integer]
rPrimes dg = takeWhile (<(10 ↑ dg)) $ filter (≥ (10 ↑ (dg - 1))) primes

isPandigital :: Integer → Bool
isPandigital x = x' ≡ (take n "123456789")
  where x' = sort $ show x
        n = length x'

nDigitPanPrimes :: Integer → [Integer]
nDigitPanPrimes n =
  let ns = map concat $ permutations $ map show [1..n]
      ns2 = map (λz → read z :: Integer) ns
  in filter isPrime ns2

main = do
  let panPrimes = concat $ map nDigitPanPrimes [1..9]
      maxPPrimes = maximum $ panPrimes
  putStrLn $ "The maximum n-digit pandigital prime is " ++ show maxPPrimes ++ "."
```

3 Result

```
runhaskell problem41.lhs
The maximum n-digit pandigital prime is 7652413.
```