Project.01

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Prj01 (L01)

A twin prime is a prime number that is either 2 less or 2 more than another prime number, see for details here: https://en.wikipedia.org/wiki/Twin_prime (https://en.wikipedia.org/wiki/Twin_prime)

- How many twin primes are bigger than one thousand but smaller than one million?
- What is the biggest twin prime you could find?

First, we creat a function to find primes.

```
is_primes <- function(n) {
  p = 2:n
  i = 1
  while (p[i] <= sqrt(n)) {
    p = p[p %% p[i] !=0 | p == p[i]]
    i = i+1
  }
  p
}
```

Then, we set up a new function based on the above one to find twin primes.

```
Twin_primes <- function(n) {
  if (n < 5) stop("Input value of n should be at least 5.")
  primes_less_than_N = is_primes(n)
  Twin_primes1 = primes_less_than_N[diff(primes_less_than_N) == 2]
  Twin_primes2 = Twin_primes1 + 2
  Twin_primes_set = data.frame(Twin_primes1 = Twin_primes1, Twin_primes2 = Twin_pr
imes2)
  return(Twin_primes_set)
}
```

Hence, we can find how many pairs of twin primes between 1,000 to 1,000,000.

```
nrow(Twin_primes(1000000)) - nrow(Twin_primes(1000))
```

```
## [1] 8134
```

By listing the last five pairs of twin primes, we find the biggest one which are 999959 & 999961.

```
tail(Twin_primes(1000000))
```

```
##      Twin_primes1 Twin_primes2
## 8164       998651       998653
## 8165       998687       998689
## 8166       999329       999331
## 8167       999431       999433
## 8168       999611       999613
## 8169       999959       999961
```