HW 2

2024-01-24

Problem 1

> If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6, and 9. The sum of these multiples is 23.Find the sum of all the multiples of 3 or 5 below 1000.

create a list of numbers 1- 999. then use remainder division to find which integers have 0 remainder. finally, sum the subset of numbers identified in step 2.

```
a <- 1:999
b <- (a %% 3 == 0) | (a %% 5 == 0)
d <- a[b]
sum(d)
```

```
## [1] 233168
```

Problem 2

> Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first terms 10 will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89. By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Loop through each output to continuously add the last two digits together. Have the function break when 4 million is reached

```
fib <- c(1, 1)
while (fib[length(fib)] < 4000000)
  {new_fib <- fib[length(fib)] + fib[length(fib) - 1]
  fib <- c(fib, new_fib)}
sum(fib[fib %% 2 == 0 & fib < 4000000])
```

```
## [1] 4613732
```

Problem 3

> The prime factors of 13195 are 5, 7, 13 and 29. What is the largest prime factor of the number 600851475143?

loop through 600851475143 by dividing each following output by 2. If the output is 0, continue to divide again by two. If not 0, divide by 3; if that output is 0, continue. If not 0, divide by 5. Continue the process stated with each prime number until a final number is reached

```r
prime_factors <- function(n) {
  factors <-unique(as.numeric(factor(n)))
  return(max(factors))
}
prime_factors(600851475143)
```

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