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**

prime\_factors <- function(n) {  
 factors <-unique(as.numeric(factor(n)))  
 return(max(factors))  
}  
prime\_factors(600851475143)

## [1] 1