

The FizzBuzz Test

- For the sake of brevity, we will run the test for values between 10 and 30.

```
In [28]: for i = 10:30
        if i % 15 == 0
            println("FizzBuzz")
        elseif i % 3 == 0
            println("Fizz")
        elseif i % 5 == 0
            println("Buzz")
        else
            println(i)
        end
end
```

```
Buzz
11
Fizz
13
14
FizzBuzz
16
17
Fizz
19
Buzz
Fizz
22
23
Fizz
Buzz
26
Fizz
28
29
FizzBuzz
```

Project Euler Question 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.

```
In [2]: function main(N)
        println(sum([x%3==0 || x%5==0 ? x : 0 | x=1:N]))
    end

println(@elapsed main(1000))
```

```
syntax: invalid assignment location
at In[2]:0
```

Using the `iseven` and `isodd` commands.

```
In [9]: X,Y=6,7
println(iseven(X))
println(iseven(Y))
println(mod(X,2)==0)
println(mod(Y,2)==0)
println(isodd(X))
println(isodd(Y))

true
false
true
false
false
true
```

Project Euler Question 2

- Each new term in the Fibonacci sequence is generated by adding the previous two terms.
- By starting with 1 and 2, the first 10 terms 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.

```
In [4]: function main()
        i = 1
        j = 1
        tot = 0
        while j <= 4000000
            next = i + j
            i = j
            j = next
            if iseven(j)
                tot += j
            end
        end
        println(tot)
    end

    ### Timing the Function
    println(@elapsed main())

4613732
0.019759551
```

Project Euler Question 3

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

Hint

- Use the `factor` command
- `factor` indicates the prime factors and the number of times each is used in the factorization
- For Example $1000 = 8 \times 125 = (2 \times 2 \times 2) \times (5 \times 5 \times 5)$
- Output is a table, more or lesss

```
In [18]: N0 = 1000
         println(factor(N0))
         typeof(factor(N0))

         [2=>3, 5=>3]
```

```
Out[18]: Dict{Int32,Int32} (constructor with 2 methods)
```

```
In [19]: N1 = 13195
         println(unique(factor(N1)))
         println(maximum(unique(factor(N1))))

         (13,1)
         (7,1)
         (5,1)
         (29,1)

         (29,1)
```

```
In [20]: N2 = (600851475143)
         println(maximum(unique(factor(N2))))

         (6857,1)
```

Project Euler Question 4

- A palindromic number reads the same both ways.
- The largest palindrome made from the product of two 2-digit numbers is $9009 = 91 \times 99$.
- Find the largest palindrome made from the product of two 3-digit numbers.

Useful Functions

- `string` converts a number to a string
- `reverse` reverse the order of the elements of a string

```
In [25]: X = 12345
println(string(X))
println(typeof(string(X)))
println(reverse(string(X)))
```

```
12345
ASCIIString
54321
```

```
In [24]: function ispalindrome(n)
           return reverse(string(n)) == string(n)

           end

println(ispalindrome(55))
println(ispalindrome(5105))
println(ispalindrome(9009))
```

```
true
false
true
```

Project Euler Question 5

- 2520 is the smallest number that can be divided by each of the numbers from 1 to 10 without any remainder.
- What is the smallest positive number that is evenly divisible by all of the numbers from 1 to 20?

The lcm command

- This command computes the least common multiple of two integers.
- Given m and n, the least common multiple is the smallest positive integer that has both m and n as factors.
- For example, the least common multiple of 12 and 18 is 36, because 12 is a factor ($12 \times 3 = 36$), and 18 is a factor ($18 \times 2 = 36$), and there is no positive integer less than 36 that has both factors.
- As a special case, if either m or n is zero, then the least common multiple is zero.

```
In [45]: X=primes(10)
Y=prod(X)
println(Y)
```

```
210
```

```
In [48]: for i in 1:10
        println(mod(Y,i))
end
```

```
0
0
0
2
0
0
0
2
3
0
```

```
In [36]: for i in 1:10
        println(mod(2520,i))
end
```

```
0
0
0
0
0
0
0
0
0
0
```

Sum the remainders

```
In [35]: tot=0
        for i in 1:10
            tot=tot+mod(2520,i)
        end
        println(tot)
```

```
0
```

```
In [39]: for i in 1:20
        println([i mod(2520,i)])
end
```

1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	1
12	0
13	11
14	0
15	0
16	8
17	4
18	0
19	12
20	0

```
In [43]: for i in 1:20
        println([i mod((2520*2*11*13*17*19),i)])
end
```

1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0

```
In [42]:
```

```
In []:
```