

November 28, 2016

Go back to the beginning before any knowledge. Fully understand everything from the beginning, numbers, primes, factorization.

## 1 primes

Numbers are just functions  $n: \mathbb{N} \rightarrow \mathbb{Z}$ . Multiplication is given by

$$(n \star m)(i) := n(i) + m(i).$$

The greatest common divisor is

$$\gcd(n, m)(i) := \min \{n(i), m(i)\}.$$

The really interesting operation is addition.

$$(n \dagger m)(i) := ???$$

The  $k$ -th prime for  $k \in \mathbb{N}$  is given by the Kronecker delta:

$$p_k(i) := \delta_{ki}.$$

With this we can state some properties of  $\dagger$  and  $\star$ . We have

$$a \star (b \star c) = (a \star b) \star c$$

$$a \dagger (b \dagger c) = (a \dagger b) \dagger c$$

$$n \star m = m \star n$$

$$n \dagger m = m \dagger n$$

$$a \star (b \dagger c) = (a \star b) \dagger (a \star c)$$

$$n \dagger n = p_0 \star n$$