$26 \times 26 \times \ldots \times 26$

26^{10}

Доказательство по инд.

$A_1, \ldots, A_n$

m - число вариантов для каждого из $A_1 \ldots A_n$

Тогда общее число вариантов равно m^n

S

Индукция по n.

1. Базовый сл. $n=1$

$m^n = m^1 = m$ ✓

2. а) Гипотеза для $A_1 \ldots A_k$

$S_k = m^k$

б) Шаг инд: добавляем позицию

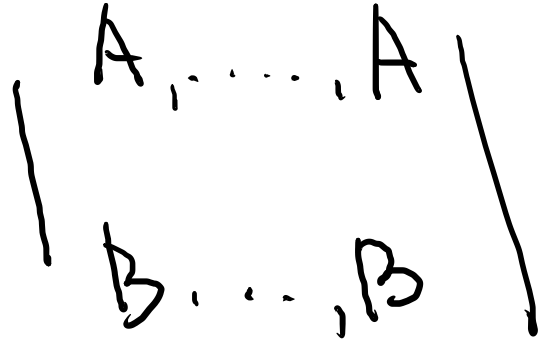
$A_1, \ldots, A_k, A_{k+1}$

$S_{k+1} = m^k \times m = m^{k+1}$

По инд. $S_n = m^n$ (для всех n)

A , B

$2^{10} - 2 = 1024 - 2 = 1022$



инд. пер. $7^k - 1 \vdots 6$

инд. шаг $7^{k+1} - 1 = 7^k \cdot 7 - 1 = 7^k \cdot (6+1) - 1 =$

$= \underbrace{6 \cdot 7^k}_{\vdots 6} + \underbrace{(7^k - 1)}_{\vdots 6 \text{ (по инд. пер.)}}$

$10 : 5$

$10 = 2 \times 5$

$10 : 2$

$10 : 3$

$10^k \mid 3 \times r$

$10 : 8$

$\frac{10^k}{r} = 3$

$\frac{1}{5} = [0,2]_{10}$

$\frac{1}{3} = 0,\overline{01}$

primes

$2, 3, 5, 7, 11, 13, 17, 19 \ldots$

"twins"

$\frac{1}{2} = [0,5]_{10}$

$\frac{1}{3} = [0,3 \ldots\ldots 3 \ldots\ldots]_{10}$

$\frac{1}{7} = 0,\overline{142857}\,\overline{142857} \ldots$

$\frac{1}{8} = 0,125 = 0,1 \times 10^{-1} + 2 \times 10^{-2} + 5 \times 10^{-3}$

$\frac{125}{1000} = \frac{1}{8} \quad | \; 8 = 2$

$\frac{1}{8} = 2^{-3}$

Th. There is no largest prime.

Proof: (reductio ad absurdum)

Let p_n is the largest. (n-its # in the ordering by $<$)

Consider $p_1, p_2, \dots, p_n$ where p_i are primes

Let $e = p_1 \times p_2 \times \dots \times p_n + 1$ | $e > p_n$

then $e : p_i$ for some i, but $e \not: p_i$ for all! no such e exc. Contradiction

Fundamental theorem of Arithmetic

for $n \in \mathbb{N}$

$$n = p_1^{k_1} \cdot \ldots \cdot p_\ell^{k_\ell}$$ whose $p_1, \ldots, p_\ell$ are primes

$k_1, \ldots, k_\ell \in \mathbb{N}$

$$28 = 4 \times 7 = \underline{2^2 \times 7}$$

$0,5 \times 2 = 1,0$

10^{-1}

$\frac{1}{10} = 0,1$

$\frac{1}{2} = [0,5]_{10} = [0,1]_2$

$a^{-n} = \frac{1}{a^n}$

$\frac{1}{4} = [0,25]_{10} = [0,01]_2$

$n > 0$ $\frac{1}{5} = [0,2]_{10}$ $\frac{3}{4} = [0,11]_2$ $[0,75]_{10} = [0,11]_2$

$0,2 \times 2 = 0,4$

$0,4 \times 2 = 0,8$

$0,8 \times 2 = 1,6$

$0,6 \times 2 = 1,2$

$[0,001100\overline{11}\ldots]_2$?

$0,75 \times 2 = 1,5$

$[0,33\ldots3\ldots]_{10} = [0,01\ldots1\ldots]_2$ $0,5 \times 2 = 1,0$

2021

Different kinds of numbers.

$x \in \mathbb{N}$

$2 + x = 5$, $x = 3$

$\mathbb{N}$ - natural numbers $1, 2, 3, \ldots$

$5 + x = 2$, there is no such nat. number!

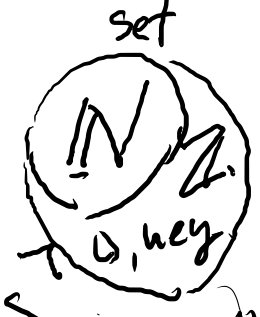
$\mathbb{Z}$ - integers $0, \pm 1, \pm 2, \pm 3, \ldots$

$a, b \in \mathbb{N}$

$a + x = b$

$x = b - a$

$5 \times 3 = 5 + 5 + 5$



"Types"

$3 : \mathbb{N}$

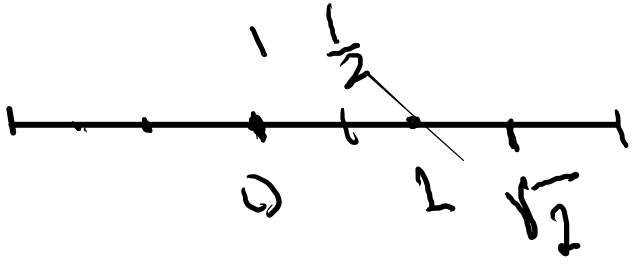
$3 : \mathbb{Z}$

$z_1, z_2 \in \mathbb{Z}$

$2 + 2$, $z + 2$

$- \times - = +$

Why?



$\sqrt{2} \neq r \in \mathbb{Q}$

$r^2 = 2.$

$\mathbb{Q}$ - rationals

$\mathbb{R}$ Reals

$x^2 = -1$

$x \in \mathbb{R}.$

$\sqrt{-1}$