Maths refreshing course
HSLU, Semester 1

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Contents

Part I

Lession 1

1 Algebric definitions

- $\mathbb{N}$:= Natural numbers
- $\mathbb{Z}$:= Integral numbers
- $\mathbb{Q}$:= Rational numbers
- $\mathbb{R}$:= Real numbers

We have that:

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$$

2 Prime numbers

A prime number is a natural number which can be devided only by itself or 1

$$\boxed{n \in \mathbb{N},\ n \neq 0, 1}$$

3 Positive powers

Let $a \in \mathbb{R}, n\mathbb{R}, n \neq 0$ and $a \subset \mathbb{R}$

$3 := 3$ $\qquad$ $3 := 3 \cdot 3$ $\qquad$ $3^{23} := 3 \cdot 3 \cdot ... \cdot 3, 23$ times

3.1 Property 1

Let $a, b \in \mathbb{R},\ n, m \in \mathbb{N}$, then

$$\boxed{a^n \cdot a^m = a^{n+m}}$$

3.2 Property 2

Let $a, b \in \mathbb{R},\ n \in \mathbb{N}$, then

$$\boxed{(a \cdot b)^n = a^n \cdot b^n}$$

Notaton: The power a^n, a is the base nad n is the exponent.

3.3 Property 3

Let $a \in \mathbb{R},\ m, n \in \mathbb{N}^*$, then

$$\boxed{(a^n)^m = a^{n \cdot m}, \text{ which is } \neq a^{(n^m)}}$$

4 Fractions

Notation 1: $a \cdot b = a \times b = ab; \quad \frac{a}{b} = a \div b = a : b$

Notation 2: a is called numerator, b is called denominator.

Notation 3: $\frac{a}{b},\ a, b \in \mathbb{R},\ b \neq 0$

4.1 Property 1

Let $a, b, c, d \in \mathbb{R},\ a, b \neq 0$

$$\boxed{\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}}$$

4.2 Property 2

Let $a, b, c, d \in \mathbb{R},\ a, b \neq 0$

$$\boxed{\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}}$$

4.3 Property 3

Let $a, b, c, d \in \mathbb{R},\ a, b \neq 0$

$$\boxed{\frac{a}{b} \pm \frac{c}{d} = \frac{a \cdot b \ \pm \ c \cdot b}{b \cdot d}}$$

5 Negative powers

5.1 Definition

$$\boxed{\forall a \in \mathbb{R},\ a \neq 0; \quad a^{-1} := \frac{1}{a}}$$

5.2 Property 1

5.3 Property 2