$(1;2)$ → zweidimensionales Tupel (Punkt)

↳ ∞ : $]1;2[_{\mathbb{R}}$

↳ $\{\}$: $]1;2[_{\mathbb{N}}$

Intervalle

→ $x \in [5;10]$: $x \geq 5 \wedge x \leq 10$

→ $x \in [5;10[$ $\quad x \geq 5 \wedge x < 10$

$x \in [5;10)$

→ Geht die eckige Klammer nach außen, dann ist die Zahl draußen.

Zeigt sie nach innen, dann ist die Zahl drinnen.

1) $\{ x \in \mathbb{Z} \mid x \bmod 3 = 0 \}$

2) $\{ x \in \mathbb{Z} \mid x \bmod 4 = 0 \;\cup\; x \bmod 5 = 0 \}$

3) $x \in \mathbb{Z} \setminus \{1\}$; $\{ x \in \mathbb{Z} \mid x \bmod 3 <> 0 \}$

4) $\{ x \in \,]4;20[\; \mid x \bmod 6 <> 0 \}$

5) $\{ x \in \mathbb{Z}^{>42} \mid x \bmod 7 = 0 \land x \bmod 3 <> 0 \}$

$\land \quad x > 42$

1) $A \cup (B \cup C) = x \in [1; 10]_{\mathbb{N}} \setminus \{9\}$

2) $B \cap C \setminus A = \{3\}$

3) $(A \cap B) \cap (A \cap C) = \{2\}$

4) $A \setminus (B \cup C) = \{4; 6; 8; 10\}$

$= \{x \in [4; 10]_{\mathbb{N}} \mid x \bmod 2 = 0\}$

III. $A = \{x \in \mathbb{Z} \mid x \bmod 5 = 0\}$; $B = [-10; 10]_{\mathbb{Z}}$

$A \cup B = \{\ldots -20; -15; -10; -9; -8 \ldots 8; 9; 10; 15; 20; \ldots\}$

$A \cap B = \{x \in \mathbb{Z} \mid |x| \leq 10 \wedge x \bmod 5 = 0\}$

$A \setminus B = \{x \in \mathbb{Z} \mid |x| > 10 \wedge x \bmod 5 = 0\}$

$B \setminus A = \{\pm 9; \pm 8; \pm 7; \pm 6; \pm 4; \pm 3; \pm 2; \pm 1\}$

$$\overline{10 + 4} = \overline{10} - \overline{4} = 20 - 6 = 14$$

$$\overline{14}$$

Distributiv neutral

$$A \cap (A \cup B) = (A \cap A) \cup (A \cap B) = A \cup (A \cap B)$$

Distr.

$$= (A \cup A) \cap (A \cup B) = A \cap (A \cup B)$$

$$(A \cup \{\}) \cap (A \cup B) = A \cup (\{\} \cap B) = A \cup \{\} = A$$

3) $\overline{\overline{A \cup B} \cup \overline{A \cup \overline{B}}}$ ← de Morgan

$\left(\overline{\overline{A \cup B}} \cap \overline{\overline{A \cup \overline{B}}} \right)$

$(A \cup B) \cap (A \cup \overline{B})$

Distributiv

$A \cup (B \cap \overline{B})$

Komplement

$A \cup \{\}$

neutral

A

Zahlenmenge

$\sqrt{-16} = \sqrt{16} \cdot \sqrt{-1}$
$= 4i$

$\mathbb{N}$

$\downarrow \subset$

$\mathbb{Z}$

$\downarrow \subset$

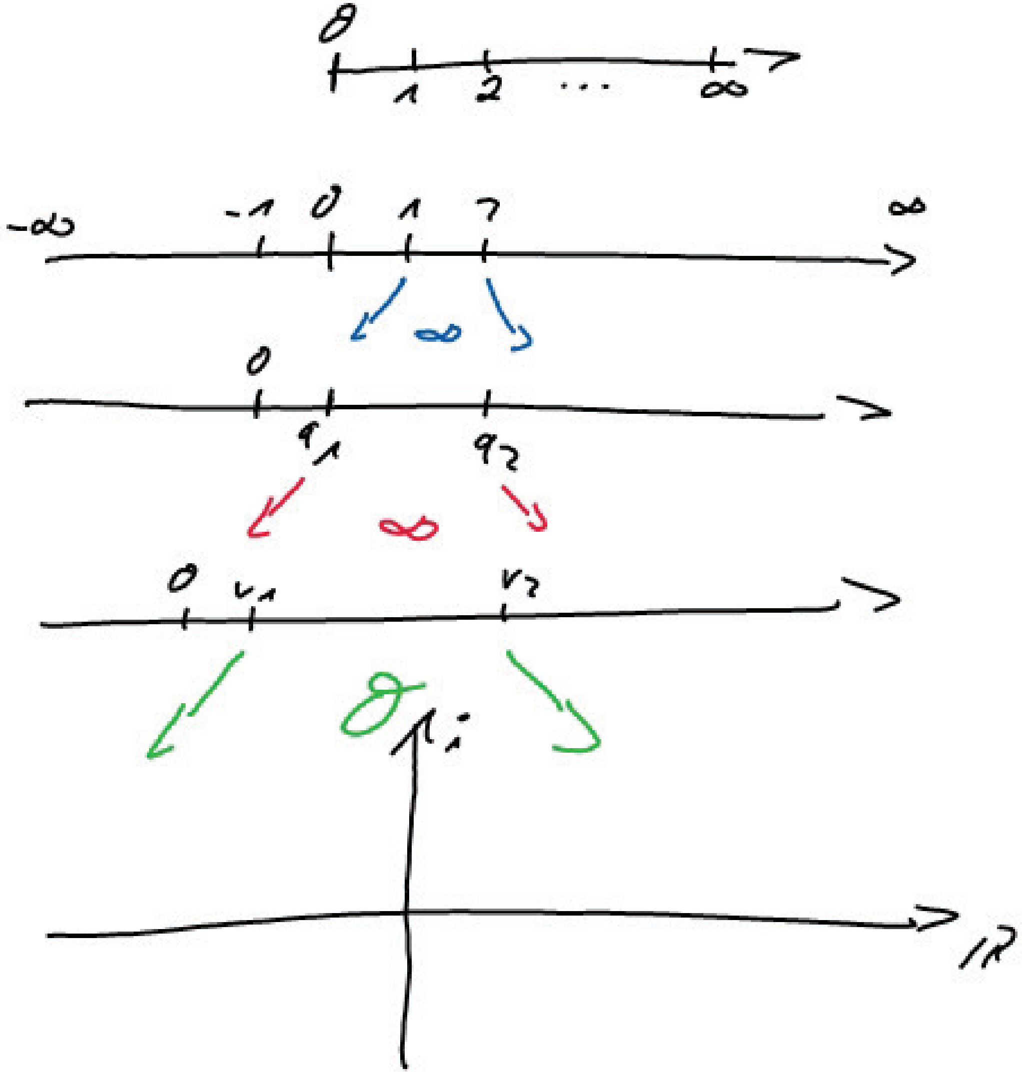
$\mathbb{Q} : \frac{a}{b}$

$\downarrow \subset$

$\mathbb{R} \to e, \sqrt{2}, \pi$

$\downarrow \subset$

$\mathbb{C} : \sqrt{-1} = i$



$(2i-4)(3i+2)-(2i-1)^2 \quad , \; i=\sqrt{-1}$

$6i^2-12i+4i-8-\left((2i)^2-4i+1^2\right)$

$6i^2-8i-8-\left(4i^2-4i+1\right)$

$-6-8i-8-\left(-4-4i+1\right)$

$-14-8i-\left(-3-4i\right)$

$-11-4i$

$i^4=i^2\cdot i^2$
$=(-1)\cdot(-1)=1$

i^{27}

$\downarrow$

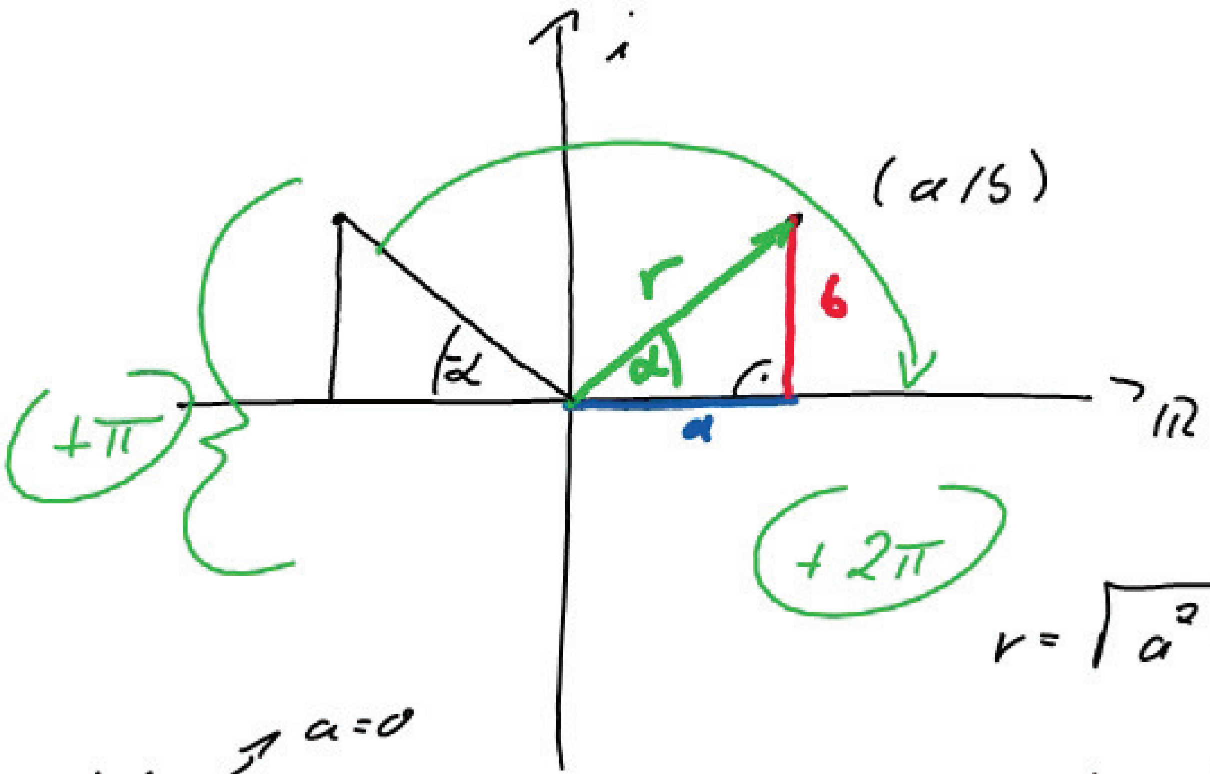
$(i^4)^6\cdot i^3=i^2\cdot i=-i$

$$(2i^5 - 3i^{10}) \cdot (6i^{22} + 2i^{19}) - (3i^{48} + 2i^{15})^2$$

$$(2i + 3)(-6 - 2i) - (3 - 2i)^2$$

$$-12i - 4i^2 - 18 - 6i - (9 - 12i + 4i^2)$$

$$-18i - 14 - (5 - 12i) = -6i - 19$$



$r = \sqrt{a^2 + b^2}$

$a = 0$

$z = -42i \longrightarrow b = -42$

$\alpha = \arctan \frac{b}{a}$

$z = a + bi$

$$\left(\frac{2}{(\sqrt{x}-3)}\right)^2 = \frac{4}{(\sqrt{x}-3)^2} = \frac{4}{x-6\sqrt{x}+9}$$

$$\frac{2}{\sqrt{x}-3} \cdot \frac{\sqrt{x}+3}{\sqrt{x}+3} = \frac{2\sqrt{x}+6}{x-9}$$

$$\frac{3i-4}{2i-1} \cdot \frac{2i+1}{2i+1} = \frac{6i^2+3i-8i-4}{4i^2-1}$$

$$= \frac{-10-5i}{-5} = \frac{-10}{-5} + \frac{-5i}{-5} = 2+i$$

$$\frac{2i+3}{3+i} - \frac{i+4}{2i+1} + 0{,}3\cdot(i-3) \quad \begin{array}{l} \to z = a+bi \\ \to r ; \alpha \end{array}$$

$$\frac{2i+3}{3+i} \cdot \frac{3-i}{3-i} = \frac{6i - 2i^2 + 9 - 3i}{9 - i^2} = \frac{11+3i}{10}$$

VIII

$$\frac{i+4}{2i+1} \cdot \frac{2i-1}{2i-1} = \frac{2i^2 - i + 8i - 4}{4i^2 - 1} = \frac{-6+7i}{-5}$$

$$\Rightarrow \quad \frac{11+3i}{10} - \frac{-6+7i}{-5} + \frac{3i-9}{10}$$

$$\frac{11 + 3i - 12 + 14i + 3i - 9}{10} = \frac{-10+20i}{10} = \overset{a}{-1} + \overset{b}{2}i$$

$$r = \sqrt{(-1)^2 + 2^2} = \sqrt{5} \qquad \alpha = \arctan(-2) + \pi$$

$$(\boxed{2}-i)^{5} = (2-i)^2\cdot(2-i)^2\cdot(2-i)$$

Pascal'sche Dreieck $(a+b)^n$

$$\left.\begin{array}{c|ccccccccccc}
n & & & & & & & & & & & \\
0 & & & & & & 1 & & & & & \\
1 & & & & & 1 & & 1 & & & & \\
2 & & & & 1 & & 2 & & 1 & & & \\
3 & & & 1 & & 3 & & 3 & & 1 & & \\
4 & & 1 & & 4 & & 6 & & 4 & & 1 & \\
5 & 1 & & 5 & & 10 & & 10 & & 5 & & 1
\end{array}\right\}$$

Koeffizienten-struktur

$$1\cdot 2^5(-i)^0 + 5\cdot 2^4(-i)^1 + 10\cdot 2^3(-i)^2 + 10\cdot 2^2(-i)^3 + 5\cdot 2^1(-i)^4 + 1\cdot 2^0(-i)^5$$

$$32 \quad - \quad 80i \quad - \quad 80 \quad + \quad 40i \quad + \quad 10 \quad - \quad i$$

$$-38 \quad - 41i$$

$$z = 15i + (0{,}5 + 2i)^4 - 1/16$$

$$1\left(\tfrac{1}{2}\right)^4(2i)^0 + 4\left(\tfrac{1}{2}\right)^3(2i)^1 + 6\left(\tfrac{1}{2}\right)^2(2i)^2 + 4\left(\tfrac{1}{2}\right)^1(2i)^3 + 1\left(\tfrac{1}{2}\right)^0(2i)^4$$

$$1/16 \quad + i \quad - 6 \quad - 16i \quad + 16$$

$$15i + \left(-15i + 10\,1/16\right) - 1/16$$

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