Definition of Number Systems

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1 Definition of Number Systems

$$\mathbb{N} = \{x \mid x = 1 \text{ or } (\exists\, i,\, j \in \mathbb{N} : \ x = i + j)\}$$

$$\mathbb{N}_0 = \mathbb{N} \cup \{0\}$$

$$\mathbb{Z} = \{a - b \mid a,\, b \in \mathbb{N}\}$$

$$\mathbb{Q} = \left\{ \frac{a}{b} \;\middle|\; a \in \mathbb{Z} \text{ and } b \in \mathbb{Z} \setminus \{0\} \right\}$$

$$\mathbb{R} = \left\{ \lim_{n \to \infty} a(n) \;\middle|\; a : \ \mathbb{N} \to \mathbb{Q} \text{ s.t. } \forall\, \epsilon > 0 : \ \exists\, \{N,\, n\} \subseteq \mathbb{N} \text{ s.t. } \forall\, n > N, |a(n) - a(N)| < \epsilon \right\}$$

$$\overline{\mathbb{R}} = \mathbb{R} \cup \{-\infty,\, +\infty\}$$

$$\mathbb{C} = \left\{ a + bi \mid a,\, b \in \mathbb{R} \text{ and } i = \sqrt{-1} \right\}$$