Numbers

Sunday, May 7, 2023 9:00 AM

$\mathbb{N} = \{1, 2, 3, \dots\}$ ← X

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

$\mathbb{Z} = -\mathbb{N} \cup \{0\} \cup \mathbb{N}$

$x+1 = 1$

$x+5 = 2$

$\mathbb{Q} = p/q, \; p, q \in \mathbb{Z}, \; \boxed{q \neq 0}$

$\mathbb{Q}^c$ = not $\mathbb{Q}$

extensions

$A = \{1, 3, 5, 6\}$

$B = \{3, 7, 6, 8\}$

$A \cup B = \{1, 3, 5, 6, 7, 8\}$

$A \cap B = \{3, 6\}$

$\mathbb{Q}$ → Terminating, Recurring

$\frac{p}{2^x \cdot 5^y}$, $p \in \mathbb{Z}$, $x, y \in \mathbb{Z}^+$

$\mathbb{Q}^c$ → Irrationals (algebraic eqn) $x^2 - c = 0$

Transcendentals

$e = 1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots \infty$

$5! = 5 \times 4 \times 3 \times 2 \times 1$

$4! = 4 \times 3 \times 2 \times 1$

$5! = 5 \times 4!$

$\rightarrow n! = n(n-1) \dots 1$

$n! = n(n-1)!$

$- \; A = 0.333\dots$

$10A = 3.333\dots$

$9A = 3$

$\Rightarrow A = 3/9 = 1/3$

$- \; A = 0.454545\dots$

$100A = 45.454545\dots$

$99A = 45$

$A = 5/11$

$A = 0.12345454\dots$

$- \; 10^3 A = 123.454545\dots$

$10^5 A = 12345.454545\dots$

$(10^5 - 10^3) A = 12345 - 123$

$\Rightarrow 99 \times 10^3 A = 12222 - 1358$

$\Rightarrow A = \frac{1358}{11000} = \boxed{\frac{679}{5500}}$

$x^2 + c = 0$

$\mathbb{C} = \{a + ib, \; a, b \in \mathbb{R}\}$

$i = \sqrt{-1}$, $\mathbb{C} \cup \{-\infty\} \cup \{\infty\}$ → Extended complex number system

$|a + ib| = \sqrt{a^2 + b^2}$

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