Why

We want to add and multiply complex numbers.[1]

Definition

Let $z_1, z_2 \in \mathbf{C}$ with $z_1 = (x_1, y_1)$ and $z_2 = (x_2, y_2)$. The *complex product* of z_1 and z_2 is the complex number $(x_1 x_2 - y_1 y_2, x_1 y_2 + y_1 x_2)$.

Notation

Properties

Proposition 1 (Distributivity). *For all $z_1, z_2, z_3 \in \mathbf{C}$, we have $z_1(z_2 + z_3)$ and $z_1 z_2 + z_1 z_3$*

Relation to $\mathbf{R}^2$

Addition in $\mathbf{C}$ corresponds to the usual addition of the corresponding vectors in the plane $\mathbf{R}^2$. In other words, it corresponds to element-wise addition. However multiplication in $\mathbf{C}$ is not componentwise multiplication in $\mathbf{R}^2$.

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[1]Future editions will expand in the genetic account for introducing complex numbers.

Complex Arithmetic

Complex Products

Complex Sums

Complex Numbers

Absolute Value Real Arithmetic

Interval Length Real Multiplicative Inverses

Intervals Real Products

Real Line Real Additive Inverses

Rational Multiplicative Inverses Rational Arithmetic Real Sums Real Order

Rational Products Rational Sums Real Numbers Rational Order

Integral Line Rational Numbers

Integer Arithmetic

Natural Multiplicative Identity Natural Additive Identity Integer Products

Identity Elements Arithmetic

Inverse Elements Natural Powers

Function Inverses Element Functions Integer Sums Integer Order Comparisons

Function Composites Function Images Operations Natural Products Natural Sums Integer Numbers Orders

Functions Recursion Theorem Equivalence Relations Natural Order Converse Relations

Peano Axioms Relations

Natural Induction Set Products

Natural Numbers Set Powers Ordered Pairs

Partitions Intersection of Empty Set Successor Sets Unordered Triples

Set Symmetric Differences Set Intersections Pair Unions

Pair Intersections Set Complements Set Unions

Empty Set Set Differences Unordered Pairs

Geometry Set Specification

Set Equality

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets Identities

Names

Letters Objects