Why

Given a real valued function (e.g., a polynomial) how do we compute its root.

Definition

Given $f : \mathbf{R} \to \mathbf{R}$, we call $f(x) = 0$ a *nonlinear equation* (a *nonlinear homogenous equation*). If $x \in \mathbf{R}$ with $f(x) = 0$ we call x a *root* or *solution* of f.

Examples

For a classic example, suppose $s \in \mathbf{R}$ is given and consider the function $f : \mathbf{R} \to \mathbf{R}$ defined by

$$f(t) = t - \sqrt{s}$$

Then the solutions $r \in \mathbf{R}$ for which $f(r) = 0$ are those points for which

$$0 = r - \sqrt{s} \Rightarrow r = \sqrt{s}$$

In other words, the *roots* of s.

Real Equation Solutions

Real Linear Equation Solutions

Real Linear Equations

Linear Functions

Arrays

N-Dimensional Space

Distance

Space Distance

Plane Distance

Interval Length

Intervals

Real Space

Real Products

Real Multiplicative Inverse

Real Square Roots

Real Squares

Real Arithmetic

Natural Square Roots

Square Numbers

Real Plane

Real Line

Real Additive Inverse

Real Summation

Real Order

Real Sums

Rational Arithmetic

Rational Multiplicative Inverse

Integral Line

Squares

Natural Summation

Real Numbers

Rational Sums

Rational Order

Rational Products

Geometry

Lists

Rational Numbers

Direct Products

Set Numbers

Natural Fractions

Integer Arithmetic

Finite Sets

Natural Multiplicative Identity

Natural Additive Identity

Integer Products

Inverse Elements

Equivalent Sets

Natural Arithmetic

Identity Elements

Family Unions and Intersections

Family Operations

Comparison

Function Inverse

Element Functions

Natural Equations

Integer Order

Integer Sums

Natural Power

Families

Function Images

Function Composites

Operations

Equations

Orders

Integer Numbers

Natural Products

Converse Relations

Functions

Natural Order

Equivalence Relations

Natural Sums

Relations

Recursion Theorem

Ordered Pair Projections

Peano Axioms

Set Products

Natural Induction

Set Powers

Generalized Set Dualities

Natural Numbers

Set Unions and Intersections

Unordered Triples

Set Dualities

Intersection of Empty Set

Successor Sets

Set Partitions

Set Symmetric Differences

Ordered Pairs

Pair Unions

Set Intersections

Set Complements

Pair Intersections

Set Unions

Set Differences

Unordered Pairs

Empty Set

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects