## 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 Plane
Real Line
Real Square Roots
Real Squares
Real Arithmetic
Real Multiplicative Inverses
Real Products
Real Additive Inverses
Natural Square Roots
Square Numbers
Real Summation
Real Order
Real Sums
Rational Arithmetic
Rational Multiplicative Inverses
Integral Line
Squares
Geometry
Natural Summation
Real Numbers
Rational Sums
Rational Order
Rational Products
Rational Numbers
Lists
Direct Products
Set Numbers
Natural Fractions
Integer Arithmetic
Integer Products
Finite Sets
Natural Multiplicative Identity
Natural Additive Identity
Inverse Elements
Equivalent Sets
Natural Arithmetic
Identity Elements
Family Unions and Intersections
Family Operations
Comparisons
Function Inverses
Element Functions
Natural Equations
Integer Order
Integer Sums
Natural Powers
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
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