Why

We want to model physical phenomena.

Definition

A *differential equation* is an equation relating functions and their derivatives.

Basic example

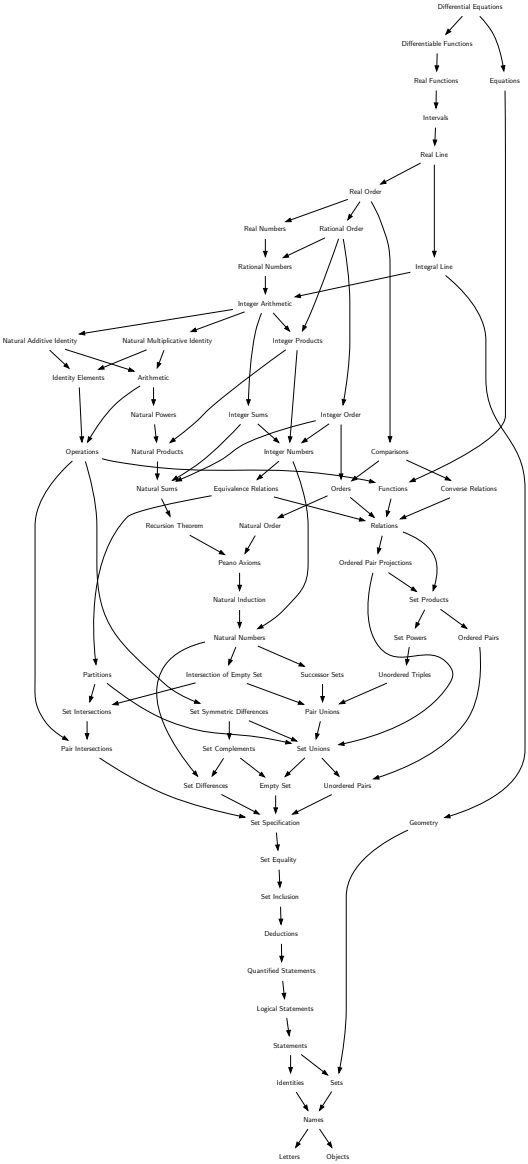
For example, let $f : \mathbf{R} \to \mathbf{R}$ be differentiable everywhere and denote the derivative of f by $f' : \mathbf{R} \to \mathbf{R}$. Suppose that there exists $\alpha \in \mathbf{R}$ so that for all $x \in \mathbf{R}$,

$$f'(x) = \alpha f(x).$$

Solutions

The *solution* of a differential equation is a function (or functions) which satisfy the equation.[1]

[1] Future editions will expand.


Differential Equations
Differentiable Functions
Real Functions
Equations
Intervals
Real Line
Real Order
Real Numbers
Rational Order
Rational Numbers
Integral Line
Integer Arithmetic
Natural Additive Identity
Natural Multiplicative Identity
Integer Products
Identity Elements
Arithmetic
Natural Powers
Integer Sums
Integer Order
Operations
Natural Products
Integer Numbers
Comparisons
Natural Sums
Equivalence Relations
Orders
Functions
Converse Relations
Recursion Theorem
Natural Order
Relations
Peano Axioms
Ordered Pair Projections
Natural Induction
Set Products
Natural Numbers
Set Powers
Ordered Pairs
Partitions
Intersection of Empty Set
Successor Sets
Unordered Triples
Set Intersections
Set Symmetric Differences
Pair Unions
Pair Intersections
Set Complements
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specification
Geometry
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects