Why

We want to model physical phenomena.

Definition

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

Basic Example

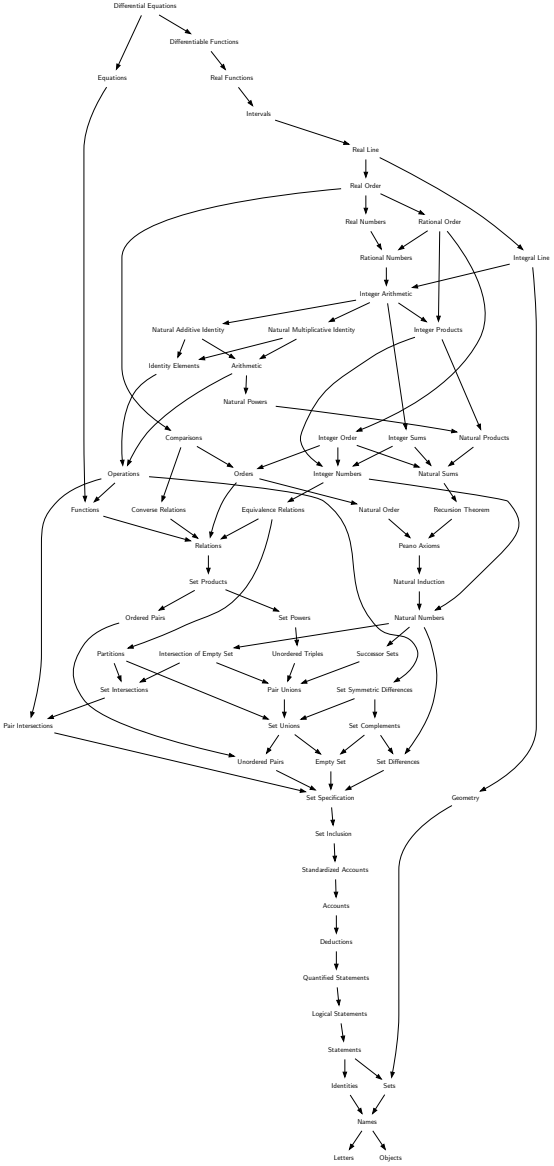
For example, let $f : \mathbf{R} \to \mathbf{R}$ be differentiable everywhere and denote the derivative of f by $f' : \mathbf{R} \to \mathbf{R}$. Suppose that there exists $\alpha \in \mathbf{R}$ so that for all $x \in \mathbf{R}$,

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

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
Equations
Real Functions
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
Comparisons
Integer Order
Integer Sums
Natural Products
Operations
Orders
Integer Numbers
Natural Sums
Functions
Converse Relations
Equivalence Relations
Natural Order
Recursion Theorem
Relations
Peano Axioms
Set Products
Natural Induction
Ordered Pairs
Set Powers
Natural Numbers
Partitions
Intersection of Empty Set
Unordered Triples
Successor Sets
Set Intersections
Pair Unions
Set Symmetric Differences
Pair Intersections
Set Unions
Set Complements
Unordered Pairs
Empty Set
Set Differences
Set Specification
Geometry
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects