Definition

An *autonomous continuous-time linear dynamical system* is a matrix $A \in \mathbf{R}^{n \times n}$. It models the behavior of a *signal* $x : \mathbf{R} \to \mathbf{R}^n$ by

$$\dot{x} = Ax, \tag{1}$$

where $\dot{x}$ is notation for $\frac{d}{dt}x(t)$. A is called the *dynamics matrix*.

A signal x satisfying Equation (1) is called a *solution* or a *trajectory*. For $t \in \mathbf{R}$, $x(t) \in \mathbf{R}^n$ is called the *state* and $\mathbf{R}^n$ is called the state space. n is called the *state dimension*.

Autonomous Continuous-Time Linear Dynamical Systems

Real Matrices

Linear Equations

Arrays Real Vectors Linear Functions

Space Vectors Plane Vector Sums and Differences N-Dimensional Space

Plane Vectors

Distance

Space Distance Differential Equations

Plane Distance Differentiable Functions

Interval Length Real Functions

Real Space Intervals

Real Plane Real Line

Integral Line Real Order Real Summation

Geometry Real Numbers Rational Order

Rational Numbers

Integer Arithmetic

Lists Set Numbers Natural Additive Identity Natural Multiplicative Identity Integer Products

Direct Products Finite Sets Identity Elements Arithmetic

Equivalent Sets Natural Summation Natural Powers

Family Unions and Intersections Comparisons Function Inverses Family Operations Natural Equations Natural Products Integer Order Integer Sums

Families Function Images Function Composites Equations Operations Orders Natural Sums Integer Numbers

Converse Relations Functions Natural Order Equivalence Relations Recursion Theorem

Relations Peano Axioms

Set Products Natural Induction

Generalized Set Dualities Set Powers Natural Numbers

Set Unions and Intersections Set Dualities Unordered Triples 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

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets Identities

Names

Letters Objects

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