Definition

A *continuous-time time-invariant linear dynamical system* is a tuple (A, B, C, D) where $A \in \mathbf{R}^{n \times n}$, $B \in \mathbf{R}^{n \times m}$, $C \in \mathbf{R}^{k \times n}$ and $D \in \mathbf{R}^{k \times m}$. Given an *input* $u : \mathbf{R} \to \mathbf{R}^m$, it models a *state* $x : \mathbf{R} \to \mathbf{R}^n$ and *output* $y : \mathbf{R} \to \mathbf{R}^k$ by

$$\dot{x} = Ax + Bu,$$
$$y = Cx + Du.$$

Here Ax is called the *drift term* and Bu is called the input term (of $\dot{x}$).

Continuous-Time Linear Dynamical Systems with Inputs and Outputs

Autonomous Continuous-Time Linear Dynamical Systems

Real Matrices

Real Linear Equations

Linear Functions   Arrays   Real Vectors

N-Dimensional Space   Space Vectors   Plane Vector Sums and Differences

Distance   Plane Vectors

Differential Equations   Space Distance

Real Differentiable Functions   Plane Distance

Real Functions   Interval Length   Real Space

Intervals   Real Plane

Real Line

Real Summation   Real Order   Integral Line   Geometry

Real Numbers   Rational Order   Natural Summation   Lists

Rational Numbers   Set Numbers   Direct Products

Natural Fractions   Integer Arithmetic   Finite Sets

Integer Products   Natural Multiplicative Identity   Natural Additive Identity   Equivalent Sets

Natural Arithmetic   Identity Elements   Function Inverses   Family Operations   Family Unions and Intersections

Natural Powers   Integer Sums   Natural Equations   Integer Order   Comparisons   Function Images   Function Composites   Families

Natural Products   Integer Numbers   Order   Equations   Operations   Functions

Natural Sums   Natural Order   Equivalence Relations   Converse Relations

Relations

Recursion Theorem   Ordered Pair Projections

Peano Axioms   Set Products

Natural Induction   Set Powers

Natural Numbers   Generalized Set Dualities   Set Unions and Intersections

Set Symmetric Differences   Partitions   Intersection of Empty Set   Successor Sets   Set Dualities   Unordered Triples   Ordered Pairs

Set Complements   Set Intersections   Pair Unions

Set Differences   Set Unions   Pair Intersections

Empty Set   Unordered Pairs

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities   Sets

Names

Letters   Objects

4