

David Poole Linear Algebra Solutions

Linear algebra

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a
1
x
1
+
...
+
a
n
x
n
=
b
,
{\\displaystyle a_{1}x_{1}+\cdots +a_{n}x_{n}=b,}

linear maps such as

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x
1
,

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,
x
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)
↦
a
1...

Kernel (linear algebra)

Linear Algebra, Society for Industrial and Applied Mathematics (SIAM), ISBN 978-0-89871-454-8, archived from the original on 2009-10-31. Poole, David

In mathematics, the kernel of a linear map, also known as the null space or nullspace, is the part of the domain which is mapped to the zero vector of the co-domain; the kernel is always a linear subspace of the domain. That is, given a linear map $L : V \rightarrow W$ between two vector spaces V and W , the kernel of L is the vector space of all elements v of V such that $L(v) = 0$, where 0 denotes the zero vector in W , or more symbolically:

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$$\begin{pmatrix} a_1 \\ a_2 \\ \vdots \\ a_n \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix} \dots$$

System of linear equations

mathematics. Computational algorithms for finding the solutions are an important part of numerical linear algebra, and play a prominent role in engineering, physics

In mathematics, a system of linear equations (or linear system) is a collection of two or more linear equations involving the same variables.

For example,

$$\begin{cases} 3x + 2y - z = 1 \\ 2x - y + 4z = 2 \end{cases}$$

=

–

2

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Linear subspace

specifically in linear algebra, a linear subspace or vector subspace is a vector space that is a subset of some larger vector space. A linear subspace is

In mathematics, and more specifically in linear algebra, a linear subspace or vector subspace is a vector space that is a subset of some larger vector space. A linear subspace is usually simply called a subspace when the context serves to distinguish it from other types of subspaces.

Row equivalence

In linear algebra, two matrices are row equivalent if one can be changed to the other by a sequence of elementary row operations. Alternatively, two $m \times n$

In linear algebra, two matrices are row equivalent if one can be changed to the other by a sequence of elementary row operations. Alternatively, two $m \times n$ matrices are row equivalent if and only if they have the same row space. The concept is most commonly applied to matrices that represent systems of linear equations, in which case two matrices of the same size are row equivalent if and only if the corresponding homogeneous systems have the same set of solutions, or equivalently the matrices have the same null space.

Because elementary row operations are reversible, row equivalence is an equivalence relation. It is commonly denoted by a tilde ($\sim$).

There is a similar notion of column equivalence, defined by elementary column operations; two matrices are column equivalent if and only if their...

GraphBLAS

defines standard building blocks for graph algorithms in the language of linear algebra. GraphBLAS is built upon the notion that a sparse matrix can be used

GraphBLAS () is an API specification that defines standard building blocks for graph algorithms in the language of linear algebra. GraphBLAS is built upon the notion that a sparse matrix can be used to represent graphs as either an adjacency matrix or an incidence matrix. The GraphBLAS specification describes how graph operations (e.g. traversing and transforming graphs) can be efficiently implemented via linear algebraic methods (e.g. matrix multiplication) over different semirings.

The development of GraphBLAS and its various implementations is an ongoing community effort, including representatives from industry, academia, and government research labs.

Seki Takakazu

Google Books Smith, pp. 128-142. , p. 128, at Google Books Poole, David. (2005). Linear algebra: a Modern Introduction, p. 279. , p. 279, at Google Books;

Seki Takakazu (西暦; c. March 1642 – December 5, 1708), also known as Seki Kōwa (西暦), was a mathematician, samurai, and Kofu feudal officer of the early Edo period of Japan.

Seki laid foundations for the subsequent development of Japanese mathematics, known as wasan from c. 1870. He has been described as "Japan's Newton".

He created a new algebraic notation system and, motivated by astronomical computations, did work on infinitesimal calculus and Diophantine equations. Although he was a contemporary of German polymath mathematician and philosopher Gottfried Leibniz and British polymath physicist and mathematician Isaac Newton, Seki's work was independent. His successors later developed a school dominant in Japanese mathematics until the end of the Edo period.

While it is not clear how much...

Timeline of numerical analysis after 1945

(according to Poole, David (2006), *Linear Algebra: A Modern Introduction* (2nd ed.), Canada: Thomson Brooks/Cole, ISBN 0-534-99845-3.) . Young, David M. (1 May

The following is a timeline of numerical analysis after 1945, and deals with developments after the invention of the modern electronic computer, which began during Second World War. For a fuller history of the subject before this period, see timeline and history of mathematics.

Cramer's rule

In linear algebra, Cramer's rule is an explicit formula for the solution of a system of linear equations with as many equations as unknowns, valid whenever

In linear algebra, Cramer's rule is an explicit formula for the solution of a system of linear equations with as many equations as unknowns, valid whenever the system has a unique solution. It expresses the solution in terms of the determinants of the (square) coefficient matrix and of matrices obtained from it by replacing one column by the column vector of right-sides of the equations. It is named after Gabriel Cramer, who published the rule for an arbitrary number of unknowns in 1750, although Colin Maclaurin also published special cases of the rule in 1748, and possibly knew of it as early as 1729.

Cramer's rule, implemented in a naive way, is computationally inefficient for systems of more than two or three equations. In the case of n equations in n unknowns, it requires computation of...

Determinant

and enlarged by William H. Metzler, New York, NY: Dover Poole, David (2006), Linear Algebra: A Modern Introduction (2nd ed.), Brooks/Cole, ISBN 0-534-99845-3

In mathematics, the determinant is a scalar-valued function of the entries of a square matrix. The determinant of a matrix A is commonly denoted $\det(A)$, $\det A$, or $|A|$. Its value characterizes some properties of the matrix and the linear map represented, on a given basis, by the matrix. In particular, the determinant is nonzero if and only if the matrix is invertible and the corresponding linear map is an isomorphism. However, if the determinant is zero, the matrix is referred to as singular, meaning it does not have an inverse.

The determinant is completely determined by the two following properties: the determinant of a product of matrices is the product of their determinants, and the determinant of a triangular matrix is the product of its diagonal entries.

The determinant of a 2×2 matrix...

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