Previous class

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Description automatically generated

Gaussian Elimination:

Augmented form:

So, the system is:

In the reduced form there is variables with only equations, so there exist at least free variables.

Here, the leading variables are

So, the free variables are

So,

So, the solution is:

Gauss-Jordan Elimination:

It is the extended version of Gaussian elimination:

Now the system can be written as:

In the reduced form there is variables with only equations, so there exist at least free variables.

Here, the leading variables are

So, the free variables are

So,

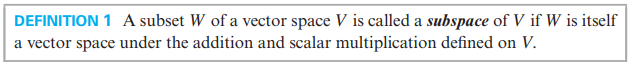
So, the solution is:

Vector Space:

A math equations and formulas

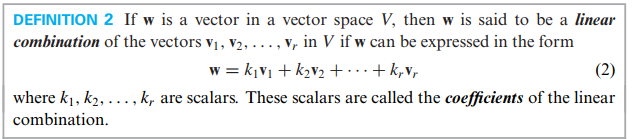
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Subspace:



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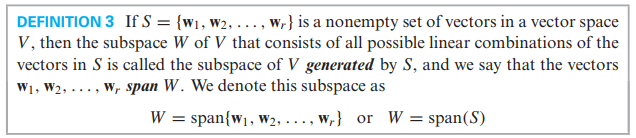
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1. Soln: Here the vectors are

If the vector is a linear combination of then there exist some scaler as

The linear system is:

Solve the equation;





Soln: Let the vector be,

If the vectors span the vector space, then the following equation must be satisfied

The system of equations is:

The coefficient matrix of the system is,

As the determinant is zero, so the system has no unique solution, so it does not span

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Soln: let there be some scalers . For linear independence, it should satisfy the following equation

The system of equations is:

So, they are linearly independent.

Basis and co-ordinate vector:

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Soln: a) let the vectors be,

The vectors form a basis in if

1. They are linearly independent
2. They span the vector space

For linear independence let the coefficient vectors , then

System:

Solving the system we get,

So, they are linearly independent.

Now, guess the vectors span then

System:

The coefficient matrix is :

The determinant's value is nonzero, so it has a unique solution. So, it spans the vector space .

Hence, they form a basis in

* Let the coordinate vector of relative to the basis vector is

System:

Solving the system we get:

So, the co-ordinate vector is

b) here, co-ordinate vector and the basis vector is , let the new vector is

so,

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Soln:

)

(interchanging row 3 and 4)

The system is:

Let are the free variables

In the solution space the basis vectors are,

So dimension is 3

Column Space

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Soln:

Column vectors are:

Linear combination:

System is:

Augmented form:

So,

So, the vector is the linear combination of the column vectors in the form

A math problem with numbers and a line

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Soln: For the null space we can write

Augmented form:

)

(interchanging row 3 and 4)

The system is:

Let are the free variables



are the basis of null space.

Nullity is the number of basis vectors in the null space

Nullity = 3

Number of columns=rank +nullity

Rank=3

