

# MATH 2116: Linear Algebra

## ClassNote: 01

Institute of Information Technology (IIT), DU

Mohd. Zulfiqar Hafiz

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# Linear Algebra

Wikipedia says, “**Linear algebra** is the branch of mathematics concerning **linear equations**. - - - Until the 19th century, linear algebra was introduced through **systems of linear equations** and **matrices**. In modern mathematics, the presentation through **vector spaces** is generally preferred, since it is more synthetic, more general, and conceptually simpler, although more abstract.”

# What is Linear Algebra?

## Basic Definition

Linear Algebra is the branch of mathematics aimed at solving systems of linear equations with a finite number of unknowns. In particular, one would like to obtain answers to the following questions:

- Are there solutions to a given system of linear equations? How many solutions are there?
- How does the solution set look? What are the solutions?

Linear Algebra is a systematic theory regarding the solutions of systems of linear equations.

# What is Linear Algebra?

## Modern Definition

linear algebra, mathematical discipline that deals with vectors and matrices and, more generally, with vector spaces and linear transformations.

Linear algebra is about linear combinations. That is, using arithmetic on columns of numbers called vectors and arrays of numbers called matrices, to create new columns and arrays of numbers. Linear algebra is the study of lines and planes, vector spaces and mappings that are required for linear transforms.

# Why do we learn it?

Because, we are looking for ‘Tathya’.

Linear algebra is a branch of mathematics. It has a wide range of applications in Physics and Mathematics. But the truth of it is that linear algebra is the mathematics of data. Matrices and vectors are the language of data. It is the basic concept for machine learning and data science.

**Linear algebra is a field of mathematics that is universally agreed to be a prerequisite to a deeper understanding of machine learning.**

# Now, I am looking for ‘Uttar’.

- 1 The sum of two numbers is 50 and the difference of them is 20. Find the numbers.
- 2 Mike and Sally are math teachers at the same high school. If Mike has 6 more years of teaching experience than Sally has, and the two of them have 16 years of teaching experience combined, how many years of teaching experience does Sally have?
- 3 The cost of a ticket to the circus is Tk. 25.00 for children and Tk. 50.00 for adults. On a certain day, attendance at the circus is 2,000 and the total gate revenue is Tk. 70,000. How many children and how many adults bought tickets?

# Now, I am looking for ‘Uttar’.

- 4 Meal tickets at the circus cost Tk. 4.00 for children and Tk. 12.00 for adults. If 1,650 meal tickets were bought for a total of Tk. 14,200, how many children and how many adults bought meal tickets?
- 5 A river cruise ship sailed 60 miles downstream for 4 hours and then took 5 hours sailing upstream to return to the dock. Find the speed of the ship in still water and the speed of the river current.
- 6 A farmer has two types of milk, one that is 24% butterfat and another which is 18% butterfat. How much of each should he use to end up with 42 gallons of 20% butterfat?

# Thanks

Thank you all.