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Рекомендовано для иностранных студентов, изучающих математику на английском языке.

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CHAPTER 1

Section 1. Linear algebra and analytical geometry

Topic 1. Matrix. Matrix Operations

Introduction. This lecture is devoted to the discussion of the following concepts: matrix, matrix equality, matrix operations, transposes and symmetric matrices.

We begin with a definition of a totally general set of matrices, and see where that takes us.

A **matrix** is a rectangular array of numbers. Several of them are referred to as **matrices**. For example, here is a matrix $\begin{pmatrix} 3 & -1 & 2 \\ 5 & -1 & 7 \end{pmatrix}$.

Definition VSM: Vector Space of $m \times n$ Matrices. The vector space $M(m \times n)$ is the set of all $m \times n$ matrices with entries from the set of complex numbers.

Just as we made, and used, a careful definition of equality for column vectors, so too, we have precise definitions for matrices.

The size or dimension of a matrix is defined as $m \times n$ where m is the number of rows and n is the number of columns. The above matrix is a 3×4 matrix because there are two rows and three columns.

The first row is $(3 \ -1 \ 2)$, the second row is $(5 \ -1 \ 7)$ The first column is $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$.

When specifying the size of a matrix, you always list the number of rows before the number of columns. Also, you can remember the columns are like columns in a Greek temple. They stand up right while the rows just lay there like rows made by a tractor in a plowed field. Elements of the matrix are identified according to position in the matrix. For example, 7 is in position 2, 3 because it is in the second row and the third column.

Using this notation on the above matrix, $a_{23} = 7$.

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