

Course N°2 Vectors in MATLAB



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📣 MATLAB°



1. Definition a vector

By default, a vector is a one-dimensional array of numbers. In other words, it is a single row with several

columns or a single column with several rows.

2. Different methods to identify a vector

Before we identify a vector in MATLAB, we must know if the vector:

2.1. Random vector

MATLAB allows you to create an *arbitrary vector or called (irregular, random) vector in three ways,

containing different numbers.

- •Each element in the vector with the order
- •All the elements inside a square bracket and between each element and the other space
- •All the elements inside a square bracket and between each element and the other comma ","

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2.2. Regular vector

MATLAB allows you to create a uniformly spaced vector called a **proper (regular)** vector in **two ways**.

- Using the function/command linspace(Xi, Xf, N); which generates N points between Xi and Xf.



- Using the function/command $\mathbf{v} = \mathbf{X}\mathbf{i} : \mathbf{P} : \mathbf{X}\mathbf{f}$; which generates v vector, with the **first** element $\mathbf{X}\mathbf{i}$,

last element Xf, and the difference between elements is any real number P.

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3. Types of the vectors

MATLAB allows you to create two types of vectors which can be stored either:

A row vectors and

A column vectors.

3.1. Row vectors

Are created and/or declared by enclosing the set of elements in square brackets, using space or comma "," to delimit the elements, which can have any number of elements. For example, there are two ways to create a row vector with six elements.



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3.2. Column vectors

Are **created** and/or **declared** by **enclosing** the set of elements in **square brackets**, using a **semicolon** ";" to **delimit** the **elements**. For example, there is **one way** to create a **column vector** with **five elements**.

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4. Vector operations

In this section, let us discuss the following vector operations

Addition and subtraction of vectors

Multiplication of vector

Division of vector

Power of vector, and

Transpose of vector

Besides the standard vector operations, MATLAB performs an element-by-element array operations

(addition, subtraction, multiplication, division, and power) among vectors of the same dimensions.

To illustrate this special feature, consider two vectors, A and B, of n=3 elements.

4.1. Addition of vectors

You can add two vectors. Both the operand vectors must be the same type and have the same number of elements.



4.2. Subtraction of vectors

Is the **difference between two given vectors**, whose defined in **MATLAB** by the following way



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4.3. Multiplication of vectors

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Fig 8. Th	e multiplication of t	wo vectors	a and b (row	vector and colur	nn vector)	

4.4. Division of vectors

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5. Other useful MATLAB functions

For vectors, to find the **maximum** and **minimum** values of the vector **x**, we use the command/function **max(.)** and **min(.)**

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To find the summation and the production values of the vector **x**, we use the command/function sum(.) and prod(.)



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Again, to **sorts** the **elements** of a given vector **x** in **descending order**, we use the command/function **sort** (.,'descend')

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The mean of a vector, also **known** as the **average equals** the **sum** of the **vector elements divided** by the **number** of **elements** in the **vector**, we use the command/function **mean(.)**



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To create a vector contain only number "1" or "0", we use the command/function **ones**(\mathbf{r} , \mathbf{c}) and **zeros**(\mathbf{r} , \mathbf{c}); where \mathbf{r} and \mathbf{c} are represent the **row** and **column** respectively.

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To show or peak or extract only one value from vector already written by MATLAB, we need to know the position or the order of that element in the vector



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g 18 To peak or extract a value in any position of the vector v				
5 10. To peak of extract a value in any position of the vector v				

In case we want to replace the recent value, we peak from the vector with another value

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	es-ES es-MX et-EE	Col	umns	7 through	8						
00 🚺	F12 v	fx		2.00	0					~ <	

To show or peak or extract more than one value from that vector already given, we need to use brackets [. .] inside the parenthesis ()



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In case we want to replace in two position different same value

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±	ar-SA bg-BG Boot		Colum	ns 1	through 6	5								
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To this end, in case we want to replace in two position different two values different of a given vector written by MATLAB



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List of References

MATLAB A Practical Introduction to Programming and Problem Solving

MATLAB A Self-Teaching Guide

MATLAB for Beginners





Mohamed Khider University of Biskra, Algeria Faculty of Sciences and Technology Department of Civil Engineering and Hydraulics 2nd Year Civil Engineering / Hydraulics / Public Works



