

# Week 1 Overview



## Overview

---

In machine learning, we represent numerical data as vectors. This week, you will learn how to express vectors in multidimensional spaces, their properties, and basic operations such as addition and scalar multiplication. Then, you will see how to combine these basic operations to create linear combinations of vectors. You will also learn about properties and basic operations of matrices such as addition and scalar multiplication, and one of the most important operations on matrices: matrix multiplication. Finally, you will learn how to use the popular scientific computing library **Numpy** to express vectors and matrices and implement their operations in Python programming language

## Learning Objectives

---



### Learning Objectives

Upon completion of this module, you will be able to:

1. Perform common operations on vectors like sum, difference, scalar multiplication, magnitude, and dot product.
2. Represent linear combinations by combining vector addition and scalar multiplication.
3. Perform common operations on matrices like sum, difference, and scalar multiplication.
4. Understand the difference between a diagonal, identity, and symmetric matrix.
5. Multiply a matrix with a vector or with another matrix.
6. Use Numpy library to implement vectors and matrix operations in Python.



## To-Do List

---

In order to successfully complete Module 1, please complete the following tasks in order:

1. Watch: Lecture Videos in Module 1.

2. Read: Lecture Slides in Module 1.
3. Read: Chapter 1 in Strang's book.
4. Watch: Numpy Tutorial in Module 1.
5. Discuss: Attend our virtual office hours to discuss any concepts we have discussed so far.
6. Complete Homework 1 published on the Assignments page.