Vector

COMP 408 - Linear Algebra
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Vectors

A *scalar* is simply a number, and a *vector* is a list of numbers.

$$\vec{a} = [4, 2]$$
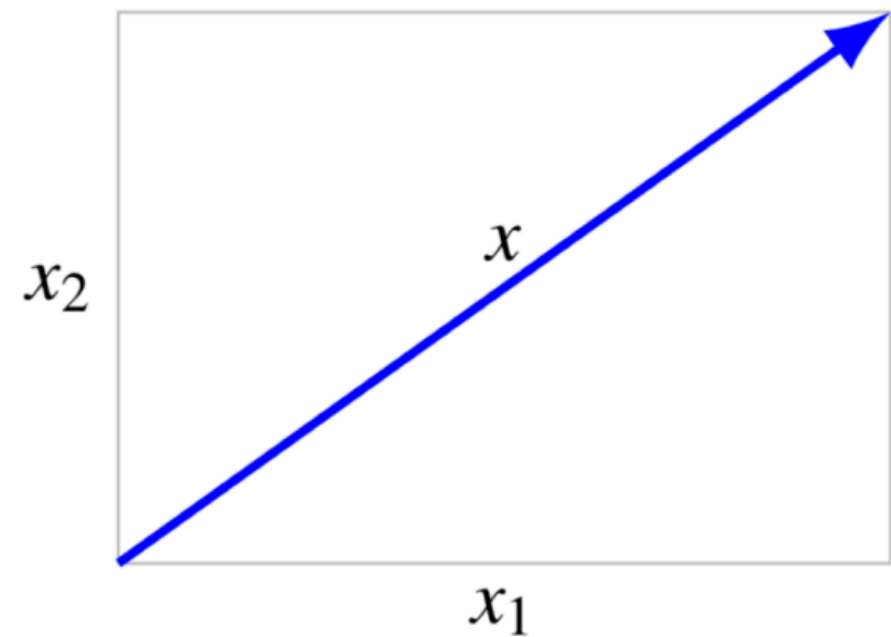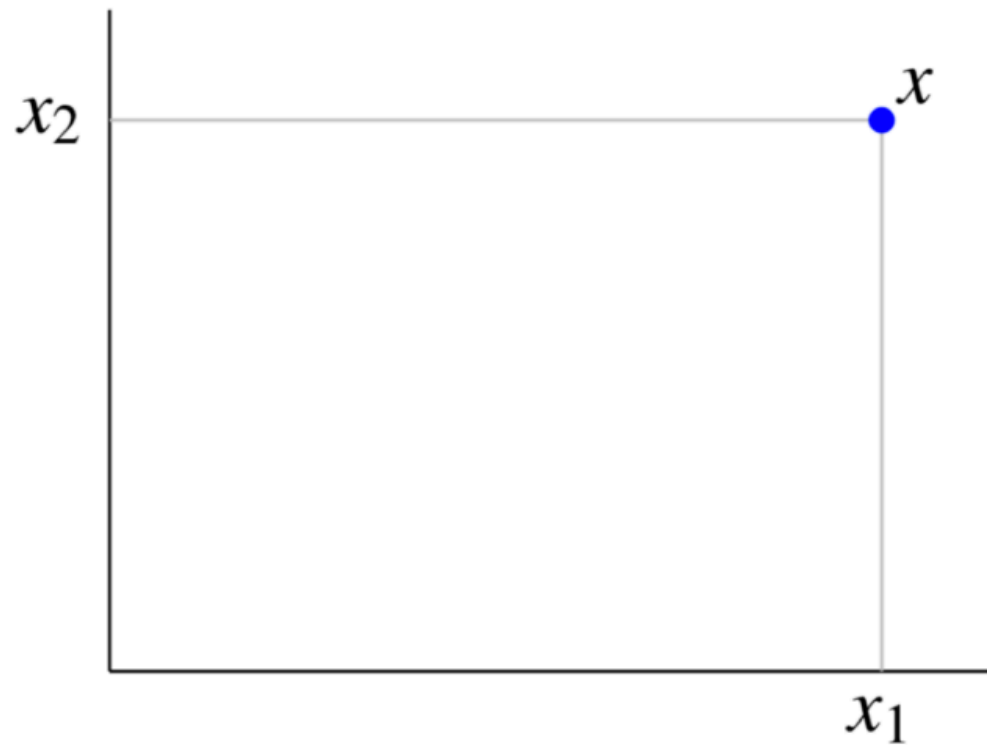$$\vec{b} = [4, 2, 3, 1]$$
$$n = 3$$

We usually denote a vector with an arrow → on top of the symbol.

Vectors

Vectors can be used to represent a location or a magnitude and a direction in a space.

Vectors - Applications

The below dictionary and word count vector store information about the number of times each word appears in the document.

Word count vectors are used in computer based document analysis. Each entry of the word count vector is the number of times the associated dictionary word appears in the document.

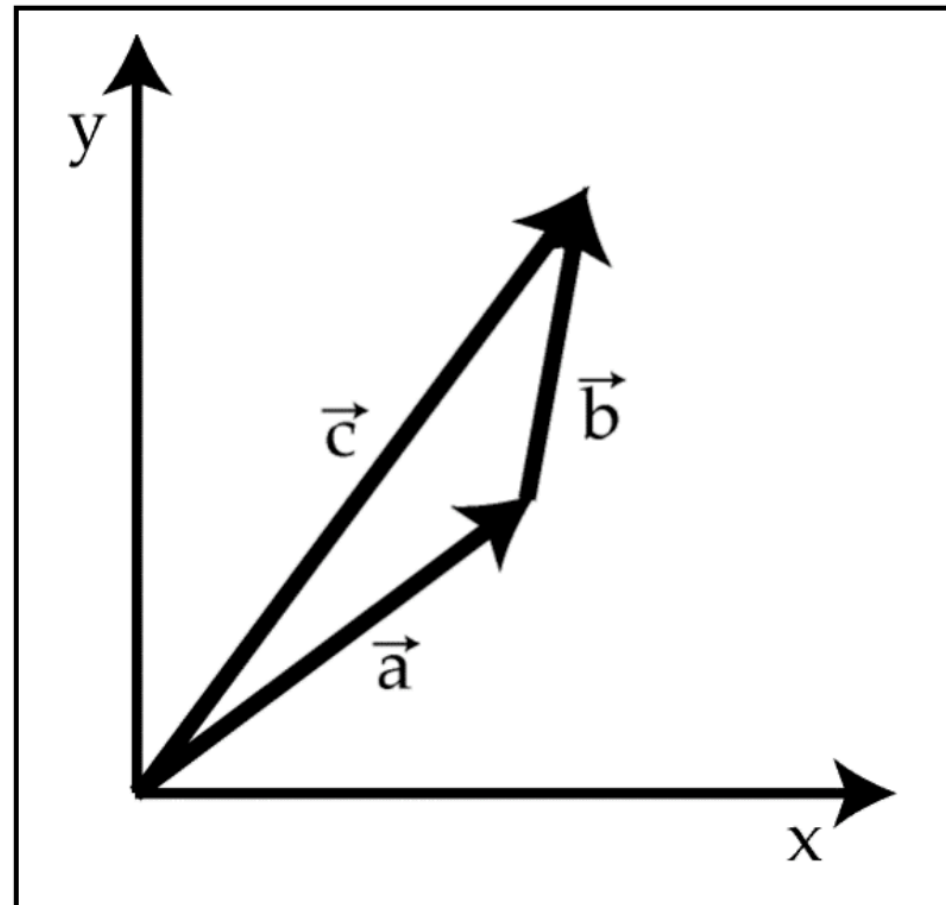| word	
word	3
in	2
number	1
horse	0
the	4
document	2

Vectors - Applications

Skill radar (vector) can be used to represents skill level of players.
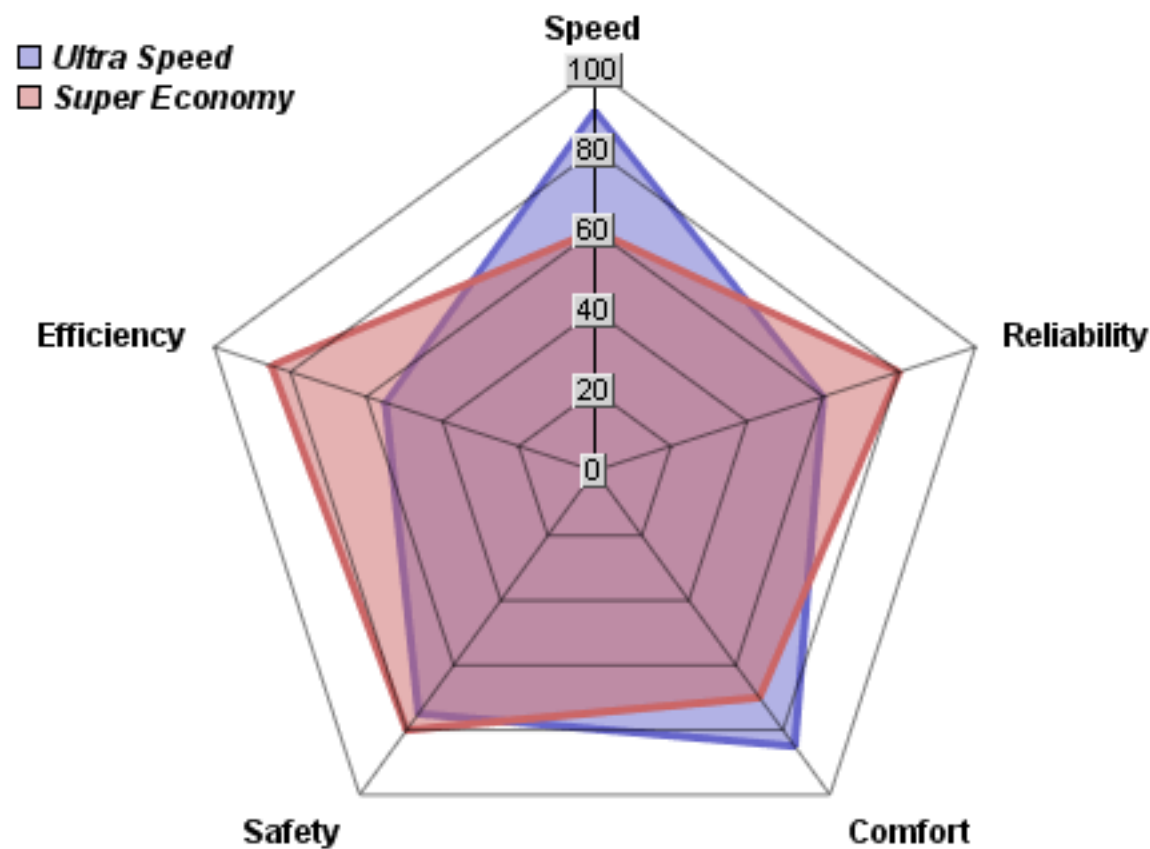
Vector addition

Vectors can be added and subtracted.

Graphically, we can think of adding two vectors together as placing two line segments end-to-end, maintaining distance and direction.

Vector addition

Numerically, we add vectors component-by-component.

Example: In the morning a ship sailed 4 miles east and 3 miles north, and then in the afternoon it sailed a further 1 mile east and 2 miles north, what was the total displacement for the whole day?

Morning trip: [4, 3]
Afternoon trip: [1, 2]
Total displacement = [4, 3] + [1, 2] = [4+1, 3+2] = [5, 5]