Vectors

#Vector : a vector is a directed line segment that represents displacement. It has a magnitude and a length. We call vectors with n real vale components vectors in R^n. This is written as $\vec{v} \in R^n$

Vector addition and subtraction happens component-wise as typical, so

$$\begin{pmatrix} u \\ v \end{pmatrix} + \begin{pmatrix} n \\ m \end{pmatrix} = \begin{pmatrix} n+n \\ v+m \end{pmatrix}$$
$$\begin{pmatrix} 4 \\ 2 \end{pmatrix} \times 2 = \begin{pmatrix} 8 \\ 4 \end{pmatrix}$$

Two vectors are equal if their components are equal $\implies$ direction and magnitude are equal, but this is hard to think about $\in R^{100}$

Projections:

$proj_{\vec{u}}\vec{v} = \frac{\vec{u}\cdot\vec{v}}{\vec{u}\cdot\vec{u}}\vec{u}$
the shadow of V onto U

#Proofs : there are four main proof strategies.

1. Direct Proof
2. Proof by contraposition
3. proof by contradiction
4. proof by induction

see next: Proofs