In The Name of God.
The Merciful, The Compassionate.

Vector Spaces

notes on Gilbert Strang videos, Lecture 06

1 Vector Spaces Requirements

Any linear combinations $c\vec{\mathbf{v}} + d\vec{\mathbf{w}}$ are in the space.

- every subspace must go through origin.
- 2 subspace: P and L
  - $P \cup U$ is not a subspace.
  - $P \cap U$ is a subspace. (proof by definition, i.e., linear combination)
- **Columnspace**: all linear combinations of columns of $A_{m \times n}$.
- $Ax = b$ can be solved exactly when b is in the column space.
- **Nullspace**: all solutions x to $Ax = 0$.
- Nullspace is a subspace.