

LINEAR ALGEBRA I

ようこそ!

LINEAR ALGEBRA Road Map

START!

LINEAR SYSTEM
MATRICES, VECTORS

Week 1-2

$$\begin{cases} 2x_1 + x_2 = 1 \\ -x_1 + 3x_2 = -2 \end{cases}$$

SETS & MAPS
-Week-3



LINEAR MAPS
Week 4-6

MIDTERM EXAM

$$\begin{pmatrix} 2 & 1 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$$

① $F(u+v) = F(u) + F(v)$
② $F(\lambda u) = \lambda F(u)$
 $F(v) = Av$

Week 9-10

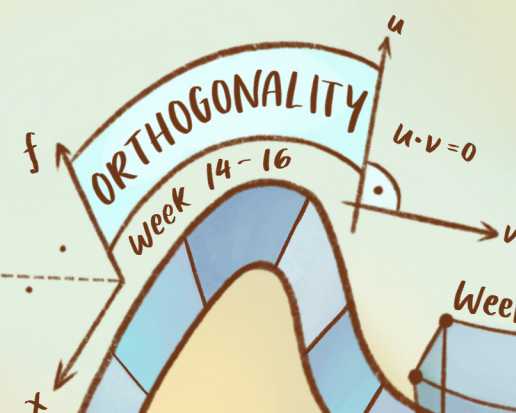
SUBSPACES
 $U = \{ \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \in \mathbb{R}^2 \mid x_1 + x_2 = 0 \}$
KERNEL
IMAGE

W8. INVERSE of linear maps

$$F: \mathbb{R}^n \rightarrow \mathbb{R}^m$$

\cup Ker F \cup im F

ORTHOGONALITY
Week 14-16



Week 13.
COORDINATES



W11-12
Bases, linear independence

$$B = \left\{ \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \right\}$$

$$\sum_{i=1}^n \lambda_i v_i = 0 \Rightarrow \lambda_i = 0 \quad \forall i$$

FINAL EXAM

Spring break

LINEAR ALGEBRA II

VECTOR SPACES
WEEK 1-2
 $F(\mathbb{R}, \mathbb{R})$ \mathbb{P} \mathbb{C} \mathbb{R}^n
 $C^\infty(\mathbb{R}, \mathbb{R})$

GOLDEN Week
W2-3

$$F: V \rightarrow W$$

$$\text{im}(F) \subset W$$

$$\text{Ker}(F) \subset V$$

$$D: f \mapsto f'$$

MIDTERM

WEEK 4-6
determinants

$$\det \begin{pmatrix} a & b \\ c & d \end{pmatrix} = ad - bc$$



Eigenvalues

Eigenvectors

$$F(v) = \lambda v$$

Week 8-10

Week 11
Applications

Dynamical Systems
 $x_{t+1} = Ax_t$

$$f''(t) + f(t) = 2t$$

LINEAR DIFFERENTIAL EQUATIONS

FINALS

FINISH

19.9% 4.2% 10.1%