MATH 3407, Linear Algebra II
Semester 2, 2023
Class Overview

We re-do the theory in Linear Algebra I for polynomials and functions instead of $\mathbb{R}^n$, and cover some additional details.

Below is a quick comparison of this class with Math 2207 (Linear Algebra I); for simplicity, not all topics in each class are listed. **You are expected to be familiar with the course content of Math 2207** as written in `http://www.math.hkbu.edu.hk/~amypang/2207/linalbook.pdf`.

Math 2207 Linear Algebra I	Math 3407 Linear Algebra II
Vectors: $\mathbb{R}^n$; scalars: $\mathbb{R}$	Vectors: polynomials, matrices, functions; scalars: $\mathbb{R}$, $\mathbb{C}$,
Span and linear independence of finite sets	Span and linear independence of infinitely many vectors
Subspaces	Combining subspaces
Linear transformations and standard matrix	Linear transformations are represented by multiple matrices, related through "change of coordinates"
Eigenvectors and diagonalisation: $A = PDP^{-1}$	Triangular form and Jordan form for non-diagonalisable matrices: $A = PJP^{-1}$
	Linear forms (functions: vector space $\to \mathbb{R}$)
Orthogonality and dot product (in $\mathbb{R}^n$)	Quadratic forms and inner product spaces (in abstract vector space)

Some other differences:

Most examples / questions are about $\mathbb{R}^n$	Most examples / questions are about abstract vector spaces, e.g. matrices, functions
You are expected to write simple proofs by recalling definitions and rearranging equations	You are expected to write more complicated proofs
Vectors are $\mathbf{v}, \mathbf{w}$ or handwritten $\vec{v}$ linear transformations are S, T, f	Vectors are α, β (no arrows nor bold print); linear transformations are σ, τ
Complete lecture slides available	Class is handwritten "live" and based on textbook; photos of the whiteboard will be on Moodle after class

To save writing time, you are expected to be familiar with the shorthands:
$\therefore$ (therefore),
$\because$ (because),
$\forall$ (for all),
$\exists$ (there exists),
$\implies$ (implies),
$\Leftrightarrow$, "iff" (if and only if).