



Sirindhorn International Institute of Technology

Thammasat University

MAS210 LINEAR ALGEBRA AND COMPLEX ANALYSIS

Class Notes on Part I

LINEAR ALGEBRA

PRELIMINARIES

These class notes were prepared as an additional resource to help the student in the course MAS210. Their purpose is to provide supplemental material to the book and class notes, including more examples and explanations. By no means they substitute the book or attendance to class.

The course MAS210 consists of two parts, linear algebra and complex analysis. This paper only covers the first part of the course.

Students often ask whether "this course is difficult". My answer is: "this course is not difficult provided you don't make it difficult". If you come regularly to class, take notes, review weekly the material, and ask questions whenever you have doubts; if you do your homework, then you are certain to pass my class with at least a B. On the other hand, missing classes, working only during exam weeks, not doing homework, you are almost guaranteed to receive a final low grade. All it's up to you. My exams are always close to the material covered in class. The problems, similar to those explained in the classroom and to those assigned as homework. So, you can expect no surprises during exam time.

You must come to see me early in the semester in case you encounter any difficulties with the material. Usually we can work out ways for overcoming difficulties so you can reach good performance, if you come in the earlier weeks of the semester. But if you visit me only in the later weeks, probably it will be too late to taking any corrective action. You should be able to solve the homework problems by our own. Even if you work in groups, to solving the problems assigned you must do it by yourself; you can compare later your solution with your peers solutions. Seeing other to solve the problems, even if you understand the procedure, may not be sufficient. Don't forget that in the exam we will be working alone.

I wish you a successful semester.

Ruben N. Mera

CONTENTS

CHAPTER 1	Linear Systems of Equations	1
	1.1 Introduction	1
	1.2 Solving a Linear System of Equations	3
	1.3 Reduced Row-Echelon Matrices	4
	1.4 Systems with one solution, infinitely many solutions, and incompatibles systems	6
	1.5 Homogeneous Linear Systems	7
	Homework	8
CHAPTER 2	Matrices and Determinants	10
	2.1 Definitions and Notation	10
	2.2 Operations with Matrices	11
	2.3 Square Matrices	12
	2.4 Finding the Inverse	13
	2.5 Application of Matrices to Solving Linear Systems	15
	2.6 Linear Combinations of Vectors	17
	2.7 Linear Independence	18
	2.8 Rank of a Matrix	20
	2.9 Linearly Independence and Rank	21
	2.10 Determinants	21
	Chapter 2 Summary	24
	Homework	25
CHAPTER 3	Vector Spaces	26
	3.1 Definition	26
	3.2 Dimension and Basis	28
	3.3 Span of a Set of Vectors	28
	3.4 Subspaces	30
	3.5 The Zero Vector Space	31
	3.6 Finite and Infinite Dimensional Vector Spaces	31
	3.7 Summary of Theorems on Vector Spaces	31
	3.8 Row Space, Column Space and Null Space	32
	Homework	33

4.1 Preliminaries and Definition	35
4.2 Finding Eigenvalues and Eigenvectors	36
4.3 Calculating Determinants	37
4.4 Triangular Matrices, Triangulation	38
4.5 Finding Rational Roots of Polynomials	39
4.6 Back to Eigenvalue Problems	41
4.7 Eigenspaces	42
Homework	43