Mathematics 213, 2021-Fall

Linear Algebra

J Hefferon, St Michael's College

Course Description We will start by solving systems of linear equations. We will then study vector spaces, including linear independence and bases. Next comes maps between vector spaces, linear maps, and their computational aspect, matrices. We will finish by learning about determinants, and then eigenvalues and eigenvectors.

Prerequisites Calculus I.

Text *Linear Algebra*, by me, edition 4, ISBN-13: 978-1944325114. A copy called `book.pdf` is in the Canvas files area. Also there are the answers, in `jhanswer.pdf`. If you download the two into the same directory then clicking on a question number takes you to its answer, and vice versa. If you prefer a paper copy (as I do) then the bookstore carries them, or you can get one from online booksellers; see the text's home page.

Two more resources: there are matching videos, and Canvas has a `slides.zip` of the classroom slides. (The book, the answers, and the slides are also available at the home page.)

Schedule This plan presumes that you have already studied the material of Section One.II, the elements of vectors.

Week	Monday	Wednesday	Friday
1	One.I.1	One.I.1, 2	One.I.2, 3
2	One.I.3	One.III.1	One.III.2
3	Two.I.1	Two.I.1, 2	Two.I.2
4	Two.II.1	Two.III.1	Two.III.2
5	Two.III.2	Two.III.2, 3	Two.III.3
6	Exam	Three.I.1	Three.I.1
7	Three.I.2	Three.I.2	Three.II.1
8	Three.II.1	Three.II.2	Three.II.2
9	Three.III.1	Three.III.2	Three.IV.1, 2
10	Three.IV.2, 3	Three.IV.4	Three.V.1
11	Three.V.1	Three.V.2	Four.I.1
12	Exam	Four.I.2	Four.III.1
13	Five.II.1	–Thanksgiving break–	
14	Five.II.1, 2	Five.II.2	Five.II.3

Expectations You must come to class, if you are able, actively participate, and do the assigned homeworks (they are listed on the back page of this sheet). Arrange your study schedule so that you try each homework before the next class. We will do a lot of working through problems and you will get the most out of this if you have tried the questions already.

Grading We will have two midterm exams and a final exam. There will also be take-home problem sets, in even-numbered weeks (when that week does not have an exam). That's four grades. Each counts equally towards the overall letter grade.

Meaning of your course grade A D tells you that although you will get credit for this course, you have dead-ended: you are not prepared for following courses. A C says that you are minimally prepared for following courses but you should expect to have to work hard there. Do not consider a C an acceptable grade; it is a warning that you have gaps that you must fill. In contrast, a B states my judgement that you are well-prepared to move up to the next level. Finally, an A marks superior performance and is the way that I get to recognize your work and encourage you to go on.

Homework These are the assigned question numbers for each subsection that we will cover.

Very important: learning math is about doing problems. That is how you get better. While the complete answers to all questions are available to you, it is crucial that before consulting an answer, you must give the question a good try on your own. If you read the question and just immediately read the answer, then you will not learn.

SUBSECTION	EXERCISES
One.I.1	17, 19, 21, 22, 24, 27
One.I.2	15–18, 21, 25, 29
One.I.3	15, 17, 18, 20, 21
One.III.1	8, 10, 12, 14
One.III.2	11, 14, 20–22
Two.I.1	18, 19, 21, 22, 28, 29
Two.I.2	20, 21, 23, 26, 27, 28
Two.II.1	21, 22, 24, 25, 28
Two.III.1	20–22, 26, 27, 31
Two.III.2	15, 17, 20, 21
Two.III.3	17–21, 23
Three.I.1	12, 13, 16, 17, 19, 21, 33
Three.I.2	10, 12, 14–16, 20
Three.II.1	18–20, 25, 26, 30, 31
Three.II.2	21, 23–26, 30, 31, 35
Three.III.1	13, 17, 19, 21, 22, 27
Three.III.2	14–16, 19, 22
Three.IV.1	8, 11 a–e
Three.IV.2	14, 15, 17–19, 21, 28
Three.IV.3	24, 25, 28, 31
Three.IV.4	13–16, 18, 29
Three.V.1	7, 9, 10, 12, 17
Three.V.2	11, 13, 16–18
Four.I.1	1, 3, 4, 6, 7, 9
Four.I.2	8, 9, 13, 18,
Four.III.1	10, 11, 13, 15, 16, 19
Five.II.1	7, 9–11, 20
Five.II.2	6–8, 11, 14
Five.II.3	24, 27, 31, 33, 34

(The text has checkmarked exercises for people reading the material on their own. I have not asked all those questions here, because people on their own benefit from doing more exercises, as they have less support.)