

Mathematics 33A: LINEAR ALGEBRA, Lecture 2

Instructor: James Ralston

Text: Linear Algebra with Applications, 4th Edition, by Otto Bretscher.

Lectures: MWF 11-11:50 in MS 4000

Sections: (listed consecutively from section number 262-221-211 to section number 262-221-216)

Tues 11:00-11:50 in MS 5117 and Thurs 11:00-11:50 in MS 5137 with Gene Kim

Tues 11:00-11:50 in MS 5127 and Thurs 11:00-11:50 in Botany 325 with Selim Bahadir

Tues 11:00-11:50 in Pub Aff 1337 and Thurs 11:00-11:50 in Geology 4645 with Bregje Pauwels

Office Hours: J.Ralston: MW 3-4 and Tues 10-12 in MS 5238.

Gene Kim: Wed 10-11 in MS 6160.

Selim Bahadir: Thurs 3-4 in MS 3905.

Bregje Pauwels: Tues 1-2 and Thurs 2-3 in MS 3903.

Welcome to Mathematics 33A! The format of this course will be more or less standard: three lectures and one discussion section per week, two hour exams and seven quizzes (quizzes are about 10 minutes long, given in discussion section), daily homework assignments but no homework handed in. Checking your homework will not be difficult, since Bretscher put the answers to all odd-numbered exercises in the back of the book. There is the inevitable question, “What happens if I miss an hour exam or a quiz?” There are no make-ups for missed hour exams, but your scores on the other hour exam and the final will be re-scaled to partially offset the missed hour exam. Likewise there will be no make-ups for missed quizzes, but only the best six quiz scores will be counted. All exams are closed book, i.e. no notes, calculators or ... cell phones.

Grading Policy: Your grade in the course is determined by the sum of your scores on the final, the two hour exams and your best six quizzes (weighted 40%, 30% and 30% respectively). If you get 80% of the possible points, you are guaranteed an A or A-. If you get 50% of the possible points, you are guaranteed a C. However, if necessary, I will move the A-/B+ line down until 25% of the class gets A or A-. Likewise, if necessary, I will move the C/C- line down until only 15% of the class gets grades below C. The median grade in this class is usually B-. Figuring out this policy – and its implications – is the first exercise in the course.

Syllabus and Exercises: The exercises listed in the syllabus below are not to be handed in. You should certainly do them – and as many more of the exercises in Bretscher as you have time for. It is a good idea to keep the exercises you do in a notebook. The problems on the quizzes will be closely related (in the eyes of the instructor) to the problems listed below. The references to “Sections” refer to the sub-chapters of the textbook. The quizzes are given in the weeks beginning with “Quiz X”, and will usually be based on the homework from the preceding week.

Sept. 24 Section 1.1 Systems of Linear Equations. Exercises: 3, 5, 7, 9, 21, 33, 47.

Sept. 27. Sections 1.2 and 1.3 Gauss-Jordan Elimination and Solutions of Linear Systems. Exercises from 1.2: 3, 5, 9, 19, 33, 41, 45, 77. Exercises from 1.3: 1, 59.

Sept 29. Section 2.1 Linear Transformations. Exercises: 5, 9, 33, 35, 37, 47.

Oct. 1. Section 2.2 Linear Transformations in Geometry. Exercises: 3, 7, 13, 17, 31, 39, 41, 43.

Quiz I

- Oct. 4. Section 2.3 Matrix Algebra, Block Matrices. Exercises: 3, 13, 17, 21, 31, 39.
Oct. 6. Section 2.4 Inverses. There is a discussion of the geometric interpretation of the determinant (with some background) on the homepage (see Geometry.pdf). Exercises: 1, 5, 7, 13, 29, 31, 39, 41.
Oct. 8. Section 3.1 Image and Kernel of a Linear Transformation. Exercises: 9, 11, 15, 19, 31, 33, 35, 37, 47, 51.
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Quiz II

- Oct. 11. Section 3.2 Linear Independence and Bases. Exercises: 1, 6, 8, 15, 19, 33, 39, 45.
Oct. 13. Review
Oct. 15. Hour Exam I
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Quiz III

- Oct. 18. Section 3.3 Dimension of a Subspace. Exercises: 11, 13, 15, 23, 31, 33, 59.
Oct. 20. Section 3.4 Coordinates (with respect to a basis). Exercises: 5, 9, 13, 19, 23, 25, 27, 47, 49, 55, 67.
Oct. 22. Section 5.1 Orthogonal Bases and Projections. Exercises: 7, 9, 13, 21, 27, 29.
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Quiz IV

- Oct. 25. Section 5.2 The Gram-Schmidt Procedure and QR Factorization. Exercises: 9, 13, 23, 27, 31, 37, 39.
Oct. 27. Section 5.3 Orthogonal Transformations and Matrices. Exercises: 7, 19, 23, 25, 39, 45.
Oct. 29. Section 5.4 The Least Squares Method. Exercises: 5, 19, 21, 23, 25, 31.
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Quiz V

- Nov. 1. Section 6.1 Introduction to Determinants. Exercises: 43, 45, 57.
Nov. 3. Section 6.2 Properties of Determinants. Exercises: 7, 9, 11, 15, 29, 31, 37, 41, 43, 45.
Nov. 5. Review
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Nov. 8. Hour Exam II

- Nov. 10. Section 6.3 Geometrical Interpretation of the Determinant and Cramer's Rule. Exercises: 1, 7, 11, 19, 23, 27.
Nov. 12. Sections 7.1 and 7.2 Introduction to Eigenvalues. Exercises for 7.1: 1, 3, 5, 9. Exercises for 7.2: 13, 17, 19.
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Quiz VI

- Nov. 15. Section 7.3 Finding Eigenvectors. Exercises: 3, 5, 9, 13, 27, 39.
Nov. 17. Section 7.4 Diagonalization. Exercises: 3, 7, 11, 15, 25, 27, 31.
Nov. 19. Section 7.5 Complex Eigenvalues. Exercises: 13, 15, 17, 21, 23.
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- Nov. 22. Section 8.1 Symmetric Matrices. Exercises: 3, 5, 9, 11, 29, 31.
Nov. 24. Section 8.2 Quadratic Forms. Exercises: 3, 5, 11, 13, 15, 23.
Nov. 26. Thanksgiving Day Holiday
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Quiz VII

- Nov. 29. Section 8.3 Singular Values. Exercises: 5, 11, 13, 17.
Dec. 1. Leeway
Dec. 3. Conclusion

FINAL EXAMINATION: Wednesday, December 8, 3-6 pm