

Inhoud / Contents

Lineaire Algebra / Linear Algebra 2DL06

Cursus / Course 2008 - 2009

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The information in this document can be changed.

The subject matter for the examination can be found in

- Elementary Linear Algebra, Bernard Kolman, David R. Hill, 8th or 9th edition, Pearson, Prentice Hall

The mentioned sections belong to the material for the examination unless indicated otherwise. Exercises have been selected for almost every section. The exercises constitute a minimal set to understand the subject matter. Make the exercises.

The numbering of the sections and exercises is in accordance with that of the 9th edition. The numbering between brackets, "[" and "]" is that of the 8th edition.

A form "[?]" indicates that there is no equivalent exercise in the 8th edition.

Elementary Linear Algebra

■ 1. Linear Equations and Matrices

□ 1.1 Systems of Linear Equations (EM)

Lecture 1

Exercises: 3, 5 [7], 7 [5], 11 [13], 13 [11]

□ 1.2 Matrices (EM)

Lecture 1

Exercises: 5 [3], 7 [6], 9 [8], 11 [10]

1.3 Matrix Multiplication (EM)

Lecture 1

Exercises: 3, 11, 16 a b, 19, 21, 23, 39 [?]

□ 1.4 Algebraic Properties of Matrix Operations (EM)

Lecture 1

Exercises: 5, 7, 9, 23 [21], 25 [23]

□ 1.5 Special Types of Matrices and Partitioned matrices (EM)

Lecture 2

Exercises: 5, 9, 13 [?], 15 [11], 19 [15], 22 [18], 29 [25], 35 [31], 37 [?], 50 [40], 51 [41]

□ 1.6 Matrix Transformations (EM)

Lecture 2

Exercises: 5, 7, 9, 15, 17

■ 2 Solving Linear Systems

□ 2.1 Echelon Form of a Matrix (EM)

Lecture 2

Exercises: 3 [?], 7 [?]

□ 2.2 [2.1] Solving Linear Systems (EM)

Lecture 2

This section is a part of the first section of Chapter 2 in the 8th edition .

Exercises: 3 [?], 5 [?], 7 [2.1.7], 11 [2.1.11], 14 [2.1.14], 21 [2.1.21], 29 [2.1.32]

No subject matter for the examination:

- Applications, page 103 in the middle - page 108 at the top, [page 92 at the top - page 94 in the middle]
- Application: Chemical Balance Equations, page 109 at the bottom - page 110 at the bottom, [??]

2.3 [2.2] Elementary Matrices; Finding A^{-1} (EM)

Lecture 3

Exercises: 3 [2.2.3], 9 [2.2.9], 11 [2.2.11], 16 [2.2.16], 19 [2.2.19], 22 [2.2.22]

□ 2.4 [2.3] Equivalent Matrices (EM)

Lecture 3

Exercises: 1 [2.3.1], 3 a c [2.3.3 a c], 6 [2.3.6], 9 [2.3.9]

■ 3 [6] Determinants

□ 3.1 [6.1] Definition (EM)

Lecture 3, 4

Exercises: 1 [6.1.1], 3 [6.1.3], 7 [6.1.7], 11 [6.1.11], 14 [6.1.14], 16 [6.1.16]

□ 3.2 [6.2] Properties of Determinants (EM)

Lecture 4

Exercises: 2 [6.2.2], 3 [6.2.3], 5 [6.2.5], 9 [6.2.9], 10 [6.2.10], 15 [6.2.15], 18 [6.2.18]

No subject matter for the examination:

- Corollary 3.2 [6.2 Corollary 6.4]

□ 3.3 [6.3] Cofactor Expansion (EM)

Lecture 5

Exercises: 1 [6.3.1], 3 [6.3.3], 5 [6.3.5], 9 [6.3.9], 12 [6.3.12], 15 [6.3.15]

□ 3.4 [6.4] Inverse of a Matrix

This section is no examination matter.

Exercises: 2 [6.4.2], 4 [6.4.4], 6 [6.4.6], 7 b [6.4.7 b], 12 [6.4.12]

□ 3.5 [6.5] Other Applications of Determinants (EM)

You must know how to use Cramer's Rule, but you don't have to know the proof for the rule.

Lecture 5

Exercises: 1 [6.5.1], 3 [6.5.3]

■ 4 [5] Real Vector Spaces

□ 4.1 [3.1] Vectors in the Plane and in 3-Space (EM)

Lectures 5 and 6

Exercises: 1 [3.1.1], 3 [3.1.3], 11 [3.1.11], 13 [3.1.13], 17 [3.1.17]

□ 4.2 [3.2] Vector Spaces (EM)

Lecture 6

Exercises: 2 [??], 7 [3.2.3], 10 [3.2.6], 25 [3.2.21]

□ 4.3 [3.3] Subspaces (EM)

Lecture 6

Exercises: 2 [3.3.2], 3 [3.3.3], 5 [3.3.5], 12 [??], 13 [??], 14 [??], 23 [3.3.19], 25 [??], 26 [3.3.22], 27 [3.3.23], 29 [3.3.25], 33 [3.3.27]

□ 4.4 [3.4] Span (EM)

Lecture 7

Exercises: 4 [??], 6 [3.4.2], 10 [3.4.6], 11 [3.4.7], 13 [??], 14 [??]

No subject matter for the examination:

- Example 2, 3, 7, 9 [3.4: example 2, 8, 9]

□ 4.5 [3.4] Linear Independance (EM)

Lecture 7

Exercises: 3 [??], 10 [3.4.10], 11 [3.4.11], 16 [3.4.16], 21 [3.4.21], 22 [3.4.22], 25 [3.4.25], 28 [3.4.28]

□ 4.6 [3.5] Basis and Dimension (EM)

Lecture 7

Exercises: 2 [3.5.2], 6 [3.5.6], 7 [3.5.7], 11 [3.5.11], 14 [3.5.14], 15 [3.5.15], 19 a [3.5.19 a], 28 [3.5.28], 35 [3.5.35], 42 [3.5.42]

□ 4.7 [3.6] Homogeneous Systems (EM)

Lecture 8

Exercises: 1 [3.6.1], 5 [3.6.5], 14 [3.6.14], 22 [3.6.22], 23 [3.6.23], 25 [3.6.25], 26 [3.6.26]

□ 4.9 [3.8] Rank of a Matrix (EM)

Lecture 8

Exercises: 1 [3.8.1], 5 [3.8.5], 7 [3.8.7], 9 a [3.8.9 a], 11 [3.8.11], 16 a [3.8.16 a], 19 a [3.8.19 a], 27 [3.8.25], 34 [3.8.28], 35 [3.8.29], 37 [3.8.31], 44 [3.8.38]

■ 5 [6] Inner Product Spaces

□ 5.1 [4.1] Length and Direction in \mathbb{R}^2 and \mathbb{R}^3 (EM)

Lecture 8

Exercises: 6 a [4.1.6 a], 7 [4.1.7], 9 [4.1.9], 11 a [4.1.11 a], 18 [4.1.18], 25, [4.1.25], 32 [4.1.32]

□ 5.2 [4.2] Cross Product in \mathbb{R}^3 (EM)

Lecture 8

Exercises: 1 [4.2.1], 7, [4.2.7], 9 [4.2.9], 13 [4.2.13], 15 [4.2.15], 19 a [4.2.19], 23 [4.2.23], 25 [4.2.25]

□ 5.3 [4.3] Inner Product Spaces (EM)

Lecture 9

Exercises: 1 [4.3.1], 7 [4.3.7], 9 a c [4.3.9 a c], 19 [4.3.19], 29 [4.3.29], 33 [4.3.33], 40 [4.3.40]

No subject matter for the examination:

- Example 2, 4, 6, 9, 11, 14 [The same examples in 8th edition]

□ 5.4 [4.4] Gram-Schmidt Process (EM)

Lecture 9

Exercises: 9 [4.4.9], 11 [4.4.11], 13 [4.4.13], 28 [4.4.28]

No subject matter for the examination:

Example 3 [The same example in 8th edition]

- QR-Factorization, page 326 at the bottom - page 329 at the bottom, [page 254 in the middle - page 257 at the bottom]

□ 5.5 [4.5] Orthogonal Complements

Lecture 10

Exercises: 1 [4.5.1], 3 [4.5.3], 9 [4.5.9], 11 a [4.5.11 a], 14 a [4.5.14 a], 15 [4.5.15]

No subject matter for the examination:

- Example 2 [The same example in 8th edition]
- Fourier Series (Calculus Required), page 343 at the bottom - page 347 at the bottom, [page 269 at the bottom - page 273 at the bottom]

■ 7 Eigenvalues and Eigenvectors

□ 7.1 Eigenvalues and Eigenvectors (EM)

Lecture 10

Exercises: 5, 7, 17, 20

□ 7.2 Diagonalization and Similar matrices

Lecture 10

Exercises: 6

□ 7.3 [7.4] Diagonalization of Symmetric Matrices

Lecture 10