Bronx Community College
of the City University of New York

Department of Mathematics and Computer Science

Syllabus: MTH 42 - Linear Algebra

Prerequisite: MTH 32 (Calculus II) or equivalent; and CUNY English Proficiency, or ENG 100 or 110, if required

Text: *Elementary Linear Algebra (Applications Version), 11th edition* H. Anton, C. Rorres, Wiley 2014

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| **SECTION** | **TOPIC** | **SUGGESTED EXERCISES (10th)** | **SUGGESTED EXERCISES (11th)** |
| 1.1 | Introduction to systems of linear equations | 2, 4, 6, 7, 9, 11-13 | 2, 3, 5, 8, 9, 13, 15, 20 |
| 1.2 | Gaussian elimination | 1-7, 13-15, 21, 25, 37 | 1-7, 15-19, 21, 25, 27, 29, 37 |
| 1.3 | Matrices and matrix operations | 1, 3, 5, 6, 7, 12, 15, 16, 17, 20, 22, 27-30 | 1, 3, 5, 6, 7, 11, 12, 15, 16, 23, 25, 27-30 |
| 1.4 | Inverses and rules of matrix arithmetic | 1,3, 5, 6, 7, 14-17, 29, 35 | 1, 2, 3, 5, 6, 7, 10, 12, 14, 18, 35, 36, 37 |
| 1.5 | Elementary matrices and a method for finding *A-*1 | 1-5, 9, 13, 15, 19, 20 | 1 - 6, 9, 13, 15, 17, 19, 20 |
| 1.6 | Further results on systems of equations, invertibility | 1, 3, 5, 10, 13, 15, 16 | 1, 3, 5, 10, 12, 13, 15, 18 |
| 2.1 | Determinants by cofactor expansion | 1-4, 19, 25, 29, 38 | 1-4, 19, 25, 29, 38 |
| 2.2 | Evaluating determinants by row reduction | 1, 3, 5, 9, 10, 13, 15, 20, 21, 27, 29 | 1, 3, 5, 7, 8, 10, 13, 14, 17, 19, 22, 23 |
| 2.3 | Properties of the determinant function | 5, 7, 9, 14, 15, 17 | 5, 7, 9, 14, 15, 17 |
| 4.1 | Real vector spaces | 3-14 | 3-14 |
| 4.2 | Subspaces | 1-5, 7-12, 17 | 1-5, 7-12, 17 |
| 4.3 | Linear independence | 1-4, 7, 9, 15 | 1-4, 7, 9, 10, 15 |
| 4.4 | Coordinates and basis | 1-5, 7-11 | 1-5, 7, 7-11, 16, 17, 20 |
| 4.5 | Dimension | 1, 3, 4, 8, 9, 12, 14, 19, 20 | 1, 3, 4, 8, 9, 12, 14, 22, 27 |
| 4.6 | Change of basis | 1-8, 13 | 1-3, 6-8, 9 |
| 4.7 | Row space, column space, and null space | 1-6, 11, 12, 16 | 1, 3, 5, 8, 9, 14, 16, 24 |
| 4.8 | Rank and nullity | 1-5, 7, 9, 13, 17, 18 | 1-6, 9, 15, 18, 19, 27 |
| 4.9 | Matrix transformations from R2 to R3 (R*n* to R*m* ) | 1, 3, 5, 7, 8, 14-16 | 1, 3, 5, 7, 8, 14-16 |
| 4.10 | Properties of matrix transformations | 1, 3, 5, 11 | 5, 10, 11, 13 |
| 5.1 | Eigenvalues and eigenvectors | 1-7, 13, 16, 18, 19, 28 | 1-6, 21, 24, 28, 29 |
| 5.2 | Diagonalization | 3, 5, 6, 7, 9, 11, 13, 15, 17, 23, 24 | 3, 5, 9,11, 14,15, 17, 20, 21, 35 |
| 8.1 | General linear transformations | 1-11, 14, 16, 18, 20, 21, 23, 25, 29, 41 | 1, 3, 5, 11, 14, 20, 21, 23, 25, 30 |
| 8.2 | Composition and inverse linear transformations | 1, 2, 5, 6, 11, 13, 15 | 1, 2, 3, 5, 11, 14, 17, |
| 8.3 | Isomorphism | 1-7, 8 | 1-11, 17, 19 |
| 8.4 | Matrices of general linear transformations | 1, 3, 5, 6, 7, 9, 13, 16, 17 | 1, 3, 6, 7, 9, 10, 14, 17 |
| 8.5 | Similarity | 1, 3, 5, 11, 12 | 1, 3, 6, 7, 9, 11, 14, 22 |

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PL (06/15)

updated 01/14/2019

updated EA 8/22 for prereq

updated EA 1/23 for COVID – removed 08/23