King Saud University / Department of Mathematics

Math-244 (Linear Algebra) / Semester 1 of Academic Year 1447H

Course Outline:

Matrices: Matrices and matrix operations; elementary row and column operations; inverse of a matrix; special matrices.

Determinants: Definition of determinant of a matrix; evaluation of a determinant; properties of determinants; adjoint of a matrix and its properties.

Systems of Linear Equations: Systems of linear equations; Gauss and Gauss – Jordan elimination

methods; homogeneous systems of linear equations; Cramer's Rule.

Vector Spaces: Definition of a vector space and examples; subspaces; linear combinations and linear span of a sets of vectors; linear dependence and linear independence of a set of vectors; basis and dimension of a vector space; coordinates of a vector with respect to a basis; change of basis; rank and nullity of a matrix.

Inner Product Spaces: Definition of inner product and inner product space with examples; orthogonal and orthonormal sets of vectors; orthonormal basis; Gram-Schmidt orthonormalization process.

Linear Transformations: Definition of a linear transformation and examples; basic properties of linear transformations; bijective linear transformation, kernel and image spaces of a linear transformation; matrix of linear transformation.

Eigenvalues, Eigenvectors and Diagonalization: Eigenvalues and eigenvectors of a matrix; diagonalization of a matrix.

Recommended Book: "Elementary Linear Algebra (Applications Version)" by Howard Anton and Chris Rorres, 11th Edition, Wiley, USA, 2014.

Exercises (from the recommended book): Exercise Set 1.1: 1-23 (odd); Exercise Set 1.2: 1-32 (odd); Exercise Set 1.3: 1-6 (all) and 9-27 (odd); Exercise Set 1.4: 1-33 (odd); Exercise Set 1.5: 2-20 (even); Exercise Set 1.6: 9-20 (all); Exercise Set 1.7: 1-25 (odd); Exercise Set 2.1: 1-31 (odd); Exercise Set 2.2: 2-30 (even); Exercise Set 2.3: 2-32 (even); Exercise Set 4.1: 1-15 (odd); Exercise Set 4.2: 1-9(all) and 10-22 (even); Exercise Set 4.3:112(all); Exercise Set 4.4: 1-22 (all); Exercise Set 4.5: 1-20 (all); Exercise Set 4.6: 1-10 (all); Exercise Set 4.7: 1-21 (odd); Exercise Set 4.8: 1-21 (odd); Exercise Set 4.10: 5-10 (all) and 11-19(odd); Exercise Set 5.1: 1-14 (all); Exercise Set 5.2: 2-20 (all). Exercise Set 6.1: 1,2, 9-12, 17,19,21, 27-29, 33-37 Exercise Set 6.2: 1-11 (odd), 22,23,31,41,44,48 Exercise Set 6.3: 2-5,27,29,32,37,43.

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