MA281: Introduction to Linear Algebra

Baker University — Fall 2023

Exam 1: Vectors and Matrices

date	day	section	topic(s)
8/23	W	§1.1: Vectors in Euclidean Space	∘ vector notation ∘ vector algebra ∘ properties of vectors
8/25	F	§1.2: The Norm and the Dot Product	∘ vector magnitude ∘ unit vectors ∘ vector dot product ∘ angles between vectors

date	day	section	topic(s)
8/28	M	§1.3: Matrices and Their Algebra	∘ matrix addition ∘ matrix multiplication ∘ scalar multiplication ∘ matrix transposition
8/29	Tu	§1.4: Solving Systems of Linear Equations	∘ elementary row operations ∘ row-echelon form ∘ reduced row-echelon form ∘ Gaussian Elimination
8/30	W	§1.4: Solving Systems of Linear Equations	∘ elementary matrices ∘ row equivalence
9/1	F	§1.5: Inverses of Square Matrices	∘ invertible matrices ∘ computation of inverses

date	day	section	topic(s)
9/4	M	*Labor Day*	
9/5	Tu	§1.6: Homogeneous Systems, etc.	∘ vector subspaces ∘ span and linear combinations ∘ basis of a vector space
9/6	W	§1.6: Homogeneous Systems, etc.	∘ row space of a matrix ∘ column space of a matrix ∘ null space of a matrix
9/8	F	§2.1: Independence and Dimension	∘ span ∘ linear independence ∘ determination of bases

date	day	section	topic(s)
9/11	M	§2.2: The Rank of a Matrix	∘ row rank ∘ column rank ∘ Rank-Nullity Theorem
9/12	Tu	§4.1: Areas, Volumes, and Cross Products	∘ determinants ∘ area of a parallelogram ∘ the vector cross product
9/13	W	§4.1: Areas, Volumes, and Cross Products	∘ volume of a box ∘ properties of cross product
9/15	F	§4.2: The Determinant of a Square Matrix	∘ determinants ∘ minors of a matrix ∘ cofactors of a matrix ∘ adjugate of a matrix

date	day	section	topic(s)
9/18	M	§4.3: Computations of Determinants, etc.	∘ properties of determinants ∘ computing determinants
9/19	Tu	§4.3: Computations of Determinants, etc.	∘ computing the adjugate ∘ computing matrix inverses
9/20	W	Exam I Review	
9/22	F	Exam I Review	

date	day	section	topic(s)
9/25	M	Exam I Review	
9/26	Tu	Exam I	

Exam 2: Eigenvalues, Eigenvectors, and Canonical Forms

date	day	section	topic(s)
9/27	W	Characteristic and Minimal Polynomials	∘ characteristic matrix ∘ characteristic polynomial ∘ minimal polynomial
9/29	F	Characteristic and Minimal Polynomials	∘ computing the polynomials ∘ relating the polynomials

date	day	section	topic(s)
10/2	M	§5.1: Eigenvalues and Eigenvectors	∘ properties of eigenvalues ∘ computing eigenvalues
10/3	Tu	§5.1: Eigenvalues and Eigenvectors	∘ properties of eigenvectors ∘ computing eigenvectors
10/4	W	§5.2: Diagonalization	∘ diagonalizability ∘ form of a diagonalizable matrix
10/6	F	§5.2: Diagonalization	∘ orthogonal matrices ∘ orthonormal matrices

date	day	section	topic(s)
10/9	M	The Cayley-Hamilton Theorem	∘ the characteristic polynomial ∘ the minimal polynomial ∘ a proof of Cayley-Hamilton
10/10	Tu	The Smith Normal Form	∘ the characteristic matrix ∘ computing the Smith Normal Form
10/11	W	The Smith Normal Form	∘ elementary divisors ∘ invariant factors
10/13	F	*Fall Break*	

date	day	section	topic(s)
10/16	M	The Rational Canonical Form	∘ invariant factors ∘ companion matrices
10/17	Tu	The Rational Canonical Form	∘ computing Rational Canonical Form
10/18	W	The Jordan Canonical Form	∘ elementary divisors ∘ Jordan blocks
10/20	F	The Jordan Canonical Form	∘ computing Jordan Canonical Form

date	day	section	topic(s)
10/23	M	Review of Canonical Forms	∘ diagonalizability ∘ diagonal matrices ∘ block-diagonal matrices
10/24	Tu	Review of Canonical Forms	∘ Smith Normal Form ∘ invariant factors ∘ elementary divisors ∘ Rational Canonical Form ∘ Jordan Canonical Form
10/25	W	Exam II Review	
10/27	F	Exam II Review	

date	day	section	topic(s)
10/30	M	Exam II Review	
10/31	Tu	Exam II	

Exam 3: Vector Spaces and Linear Transformations

date	day	section	topic(s)
11/1	W	§2.3: Linear Transformations of Euclidean Spaces	∘ functions ∘ linearity ∘ properties ∘ subspaces
11/3	F	§2.3: Linear Transformations of Euclidean Spaces	∘ rank and nullity ∘ matrices ∘ invertibility

date	day	section	topic(s)
11/6	M	§3.1: Vector Spaces	∘ vector space definition ∘ vector space examples
11/7	Tu	§3.1: Vector Spaces	∘ vector space properties ∘ vector subspaces
11/8	W	§3.2: Basic Concepts of Vector Spaces	∘ span ∘ linear independence ∘ subspace tests ∘ vector space dimension
11/10	F	§3.3: Coordinatization of Vector Spaces	∘ ordered bases ∘ coordinate vectors

date	day	section	topic(s)
11/13	M	§7.2: Matrix Representations and Similarity	∘ matrix representation ∘ similarity of matrices ∘ change of basis
11/14	Tu	§3.4: Linear Transformations	∘ properties ∘ injectivity ∘ surjectivity ∘ subspaces ∘ further examples
11/15	W	§3.5: Inner Product Spaces	∘ Vector Dot Product ∘ Matrix Dot Product ∘ further examples
11/17	F	§3.5: Inner Product Spaces	∘ properties ∘ Triangle Inequality ∘ Cauchy-Schwarz

date	day	section	topic(s)
11/20	M	Exam III Review	
11/21	Tu	Exam III Review	
11/22	W	*Thanksgiving Break*	
11/25	F	*Thanksgiving Break*	

date	day	section	topic(s)
11/28	M	Exam III Review	
11/29	Tu	Exam III	

Final Exam Review

date	day	section	topic(s)
11/30	W	Final Exam Review	
12/1	F	Final Exam Review	

date	day	section	topic(s)
12/4	M	Final Exam Review	
12/5	Tu	Final Exam Review	
12/6	W	Final Exam Review	
12/8	F	Final Exam Review	

Final Exam: DATE; TIME to TIME; LOCATION