

Exam I Topics
Math 22, Spring 2007

Sections covered: 1.1–1.5, 1.7–1.9, 2.1–2.3 (11)

- (1) Terms: linear equation, coefficient, system of linear equations, solution, solution set, equivalent systems, consistent system, inconsistent system
- (2) Allowed steps to solve a system of linear equations
- (3) How many solutions a system of linear equations may have
- (4) Vectors I: equality, sums, scalar multiplication, geometric interpretation, linear combinations and weights, span
- (5) Vectors II: linear dependence and independence
- (6) Matrices: size, equality, sums, scalar multiplication, standard notation for entries, main diagonal, multiplication by vectors or other matrices
- (7) Matrices and linear equations I: coefficient matrix, augmented matrix, elementary row operations, row equivalence, echelon form, reduced echelon form, leading entry, pivot position, pivot column, basic/leading and free variables
- (8) Connections between pivots and solutions: Theorem 2 in §1.2
- (9) Matrices and linear equations II: interpreting the matrix equation $A\mathbf{x} = \mathbf{b}$ in terms of linear combinations and systems of linear equations
- (10) Methods of presenting solution sets: general solutions as in §1.2, parametric descriptions as in §1.5, homogeneous systems, trivial solution to $A\mathbf{x} = \mathbf{0}$, nonhomogeneous systems in terms of homogeneous systems
- (11) Linear transformations: domain, codomain, range, image, preimage, matrix transformation, definition of linearity, finding a matrix for a transformation, one-to-one and onto transformations, geometric transformations of \mathbb{R}^2 , connections to vector properties of the columns of the transformation matrix
- (12) Matrix inverses: 2×2 determinant and connection to invertibility and calculation of inverse, inverse of a product, elementary matrix, finding inverses for larger matrices than 2×2 , connection to linear transformations, equivalent conditions to invertibility