Linear Algebra

Vocabulary for Chapters 1 - 3

Chapter 1

linear equation
unknowns
solution
solution set/general solution
parameter
linear system
consistent/inconsistent
augmented matrix
elementary row operations
(reduced) row-echelon form
leading variables/free variables
elimination
Gaussian/Gauss-Jordan Elimination
back-substitution
trivial solution
nontrivial solutions
matrix
entries
column matrix
row matrix
scalar
square matrix
main diagonal
sum/difference/scalar product/product
linear combination
partitioned
submatrices
coefficient matrix
transpose of A
trace of A
zero matrix
identity matrix
inverse
invertible/nonsingular
singular/non-invertible
elementary matrix
inverse operations
row equivalent
diagonal matrix
lower/upper triangular
symmetric
commute

Chapter 2

determinant
permutation
inversion
elementary product
signed elementary product from A
determinant function
eigenvalue
eigenvector
characteristic equation
minor entry of a_{ij}
cofactor of entry a_{ij}
cofactor expansion
matrix of cofactors from A
adjoint of A
Cramer's Rule

Chapter 3

Vectors and associated vocabulary
inner/dot product
cross product
projection
orthogonal
standard unit vectors
scalar triple product
equations of a plane
    point-normal form
    general form
    vector form
equations of a line
    parametric form
    symmetric form
    vector form

Equivalent Statements (If A is an $n \times n$ matrix)

a) A is invertible.
b) $A\mathbf{x} = \mathbf{0}$ has only the trivial solution.
c) The reduced row-echelon form of A is I_n.
d) A is expressible as a product of elementary matrices.
e) $A\mathbf{x} = \mathbf{b}$ is consistent for every $n \times 1$ matrix $\mathbf{b}$.
f) $A\mathbf{x} = \mathbf{b}$ has exactly one solution for every $n \times 1$ matrix $\mathbf{b}$.
g) $\det(A) \neq 0$