

5.1	Introduction to Signal Compression Using Haar Wavelets	141
5.2	Haar Matrices, Scaling Properties of Haar Wavelets	143
5.3	Kronecker Product Construction of Haar Matrices	148
5.4	Multiresolution Signal Analysis with Haar Bases	150
5.5	Haar Transform for Digital Images	153
5.6	Hadamard Matrices	159
5.7	Summary	161
5.8	Problems	162
6	Direct Sums	167
6.1	Sums, Direct Sums, Direct Products	167
6.2	Matrices of Linear Maps and Multiplication by Blocks	177
6.3	The Rank-Nullity Theorem; Grassmann's Relation	190
6.4	Summary	198
6.5	Problems	198
7	Determinants	207
7.1	Permutations, Signature of a Permutation	207
7.2	Alternating Multilinear Maps	211
7.3	Definition of a Determinant	215
7.4	Inverse Matrices and Determinants	224
7.5	Systems of Linear Equations and Determinants	227
7.6	Determinant of a Linear Map	229
7.7	The Cayley–Hamilton Theorem	230
7.8	Permanents	235
7.9	Summary	237
7.10	Further Readings	239
7.11	Problems	239
8	Gaussian Elimination, LU, Cholesky, Echelon Form	245
8.1	Motivating Example: Curve Interpolation	245
8.2	Gaussian Elimination	249
8.3	Elementary Matrices and Row Operations	254
8.4	LU -Factorization	257
8.5	$PA = LU$ Factorization	263
8.6	Proof of Theorem 8.5 \otimes	271
8.7	Dealing with Roundoff Errors; Pivoting Strategies	276
8.8	Gaussian Elimination of Tridiagonal Matrices	278
8.9	SPD Matrices and the Cholesky Decomposition	280
8.10	Reduced Row Echelon Form	289
8.11	RREF, Free Variables, Homogeneous Systems	295
8.12	Uniqueness of RREF	298
8.13	Solving Linear Systems Using RREF	300