4.6 Rank and Nullity 206
4.7 Chapter Review 216

5 Linear Transformations 218
5.1 Linear Transformations in General Vector Spaces 218
5.2 Kernel and Range 225
5.3 Matrices of Linear Transformations 237
5.4 Chapter Review 252

6 Orthogonality and Projections 254
6.1 Orthogonality 254
6.2 Orthogonal Projections and Orthogonal Complements 261
6.3 Gram-Schmidt Process and Least Squares Approximation 276
6.4 Introduction to Singular Value Decomposition 284
6.5 Chapter Review 294

7 Eigenvalues and Singular Values 296
7.1 Eigenvalues and Eigenvectors 296
7.2 Diagonalization 311
7.3 Applications of Eigenvalues and Eigenvectors 325
7.4 Singular Value Decomposition 340
7.5 Chapter Review 360

A Answers to Selected Odd-Numbered Exercises 362

B Recurring References to Selected Transformations in $\mathbb{R}^2$ 377

C Twelve Equivalent Statements 379

Index 381