

# MATH 251 Recommended Practice Problems

(5th edition of *Linear Algebra: A Modern Introduction* by Poole)



SECTION	EXERCISES
1.1 The Geometry and Algebra of Vectors	1, 3, 5(a,b), 7, 9, 13, 15, 17, 19, 21
1.2 Length and Angle: The Dot Product	3, 5, 11, 15, 17, 19, 25, 31, 33, 35, 41, 43, 47, 49, 51, 61, 63
1.3 Lines and Planes	1, 3, 5, 7, 9, 13, 15, 19(a,b), 21, 23, 27, 29, 31, 33, 35, 37, 43
Exploration: The Cross Product	1, 2, 4, 5(a), 6(a), 8(c)
2.1 Introduction to Systems of Linear Equations	1, 3, 5, 7, 9, 13, 15, 17, 21, 23, 27, 29, 31, 35, 37, 41
2.2 Direct Methods for Solving Linear Systems	1, 3, 7, 9, 11, 13, 21, 23, 25, 27, 29, 33, 35, 37, 41, 45, 49
2.3 Spanning Sets and Linear Independence	1, 3, 5, 7, 9, 11, 13, 15, 17, 23, 25, 27, 29, 31
2.4 Applications	1, 3, 5, 7, 9, 11, 45
3.1 Matrix Operations	1, 3, 5, 7, 9, 13, 15, 17, 21, 31, 33, 35, 38(a), 39(c)
3.2 Matrix Algebra	1, 3, 5, 7, 9, 13, 15, 23, 37
3.3 The Inverse of a Matrix	1, 3, 5, 9, 11, 13(a,b), 21, 23, 25, 27, 29, 31, 33, 35, 39, 49, 53, 55, 57
3.4 The LU Factorization	1, 3, 7, 9, 11, 15
3.5 Subspaces, Basis, Dimension, and Rank	3, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29, 31, 35, 37, 39, 41, 45, 51
3.6 Introduction to Linear Transformations	1, 3, 5, 7, 11, 13, 15, 17, 19, 21, 23, 25, 27, 31, 37, 43, 45
Appendix C – Complex Numbers (exercises online)	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37
4.1 Introduction to Eigenvalues and Eigenvectors	3, 5, 7, 11, 13, 15, 23, 25, 27, 35, 37
4.2 Determinants	1, 5, 7, 13, 15, 17, 23, 27, 29, 33, 35, 37, 45, 47, 49, 51, 55, 57, 59, 63
Exploration: Geometric Applications of Determinants	1, 2, 4, 6
4.3 Eigenvalues and Eigenvectors of $n \times n$ Matrices	1, 3, 5, 7, 9, 15, 17, 21
4.4 Similarity and Diagonalization	5, 7, 9, 11, 13, 15, 17, 21, 27, 43
5.1 Orthogonality in $\mathbb{R}^n$	3, 5, 7, 9, 15, 17, 19, 21, 23, 25, 29
5.2 Orthogonal Complements and Orthogonal Projections	1, 3, 5, 7, 9, 11, 13, 17, 21
5.3 The Gram-Schmidt Process and the QR Factorization	1, 3, 5, 7, 9, 11, 13, 15, 17
5.4 Orthogonal Diagonalization of Symmetric Matrices	1, 3, 5, 21, 23
7.3 Least Squares Approximation	7, 9, 11, 15, 17, 19, 21

CHAPTER REVIEW	PAGES	EXERCISES
Chapter 1 Vectors	53	1(a-g), 3, 5, 7, 9, 11, 13, 15
Chapter 2 Systems of Linear Equations	120-121	1, 3, 7, 9, 11, 15, 19
Chapter 3 Matrices	230-231	1, 3, 5, 9, 11, 13, 15, 19
Chapter 4 Eigenvalues and Eigenvectors	329-330	1, 3, 7, 9, 11, 17, 19
Chapter 5 Orthogonality	384-385	1, 3, 5, 9, 11, 13, 15, 17, 19
Chapter 7 Distance and Approximation	566-567	13, 14