

Santiago Canyon College, Spring 2012, Mr. Scott
 Math 287, Introduction to Linear Algebra & Differential Equations
 Text: Goode, Stephen & Annin, Scott, *Differential Equations & Linear Algebra*, 3e

All of the following refer to the **Problems** section of the exercise sets.

Ch. 1 First-Order Differential Equations

| Section | Assignment |
|---|---|
| 1.1 How Differential Equations Arise | 1, 3, 7, 11, 13, 15, 24 |
| 1.2 Basic Ideas and Terminology | 1-6, 7, 9, 13, 17, 21, 27, 29, 33, 35, 37, 39, 43*, 49* |
| 1.3 The Geometry of First-Order Differential Equations | 1, 3, 7, 9, 12-15, 19, 23, 27*, 31*, 32* |
| 1.4 Separable Differential Equations | 1, 3, 5, 7, 8, 13, 14, 17, 25 |
| 1.5 Some Simple Population Models | 1, 4, 5, 9, 10 |
| 1.6 First-Order Linear Differential Equations | 1, 3, 5, 6, 11, 13, 17, 19, 22, 28, 29, 31 |
| 1.7 Modeling Problems Using FOLDEs | 1, 3, 5, 9, 11, 12, 13 |
| 1.8 Change of Variables | 1, 3, 5, 7, 11, 15, 19, 25, 28a, 29, 37, 39, 44, 51 |
| 1.9 Exact Differential Equations | 1-3, 5, 9, 13, 17, 21, 25 |
| 1.10 Numerical Solution to First-Order Differential Equations | 1, 3, 11, 13 |
| 1.11 Some Higher-Order Differential Equations | 1, 3, 4, 11, 15 |
| 1.12 Chapter Review | |

Ch. 2 Matrices and Systems of Linear Equations

| Section | Assignment |
|--|--|
| 2.1 Matrices: Def'ns and Notation | 1, 5, 6, 9, 12, 13, 14, 16-20, 21, 23 |
| 2.2 Matrix Algebra | 2, 3, 4, 7, 10, 11, 13, 14, 19, 20, 27, 31, 32, 33, 34, 37, 40, 41, 42, 43 |
| 2.3 Terminology for Systems of Linear Equations | 3, 6, 7, 9, 10, 11, 13, 14, 15 |
| 2.4 Elementary Row Operations and Row-Echelon Matrices | 1, 4, 7, 8, 10, 11, 15, 23 |
| 2.5 Gaussian Elimination | 3, 4, 7, 9, 12, 13, 17, 18, 21, 23, 25, 37, 39, 41, 45, 50 |
| 2.6 The Inverse of a Square Matrix | 4, 5, 11, 20, 21, 25, 29, 30, 37 |
| 2.7 Elementary Matrices and the LU Factorization | 2, 3, 7, 11 |
| 2.8 The Invertible Matrix Theorem | 1, 2, 3 |
| 2.9 Chapter Review | |

Ch. 3 Determinants

| Section | Assignment |
|-----------------------------------|---|
| 3.1 The Def'n of the Determinant | 3, 4, 5, 7, 9, 11, 15, 16, 21, 22, 23 |
| 3.2 Properties of the Determinant | 5, 10, 15, 18, 20, 21, 23, 31, 33, 42, 46, 49 |
| 3.3 Cofactor Expansions | 1, 4, 5, 10, 15, 23, 29, 33, 37 |
| 3.4 Summary of Determinants | 3, 7, 8, 9, 18, 19 |
| 3.5 Chapter Review | |

Ch. 4 Vector Spaces

| Section | Assignment |
|---|--|
| 4.1 Vectors in \mathbb{R}^2 | 1, 3, 4 |
| 4.2 Def'n of a Vector Space | 1, 2, 3, 4, 5, 7, 9, 10, 11, 17, 18 |
| 4.3 Subspaces | 1, 3, 4, 7, 8, 9, 11, 13, 14, 15, 18, 21, 22 |
| 4.4 Spanning Sets | 1, 3, 7, 9, 11, 15, 19, 20, 23, 24, 27, 28 |
| 4.5 Linear Dependence and Linear Independence | 3, 4, 5, 7, 11, 13, 15, 16, 18, 19, 23, 26, 27, 29, 31, 39, 45 |
| 4.6 Bases and Dimension | 3, 5, 11, 13, 15, 21, 22, 27, 32, 33, 34 |
| 4.7 Change of Basis | 1, 3, 7, 9, 11, 17, 19, 21, 23 |

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| 4.8 Row Space and Column Space | 1, 3, 6, 7, 8 |
| 4.9 The Rank-Nullity Theorem | 1, 3, 4, 5, 6, 9, 11, 12 |
| 4.10 The Invertible Matrix Theorem II | Do the True-False Review, 1-10 |
| 4.11 Inner Product Spaces | 1, 3, 4, 6, 13-17 |
| 4.12 Orthogonal Sets of Vectors and the Gram-Schmidt Process | 3, 5, 7, 9, 11, 13, 15, 21, 23, 29 |
| 4.13 Chapter Review | |

Ch. 5 Linear Transformations

| Section | Assignment |
|--|--|
| 5.1 Definition of a Linear Transformation | 1, 3, 5, 6, 13, 14, 17, 19, 23, 28, 29 |
| 5.2 Transformations of \mathbb{R}^2 | 1, 2, 7, 9 |
| 5.3 The Kernel and Range of a Linear Transformation | 1, 2, 5, 12, 13, 15 |
| 5.4 Additional Properties of Linear Transformations | 1, 3, 4, 5, 9, 15, 16, 25 |
| 5.5 The Matrix of a Linear Transformation | 1, 5, 7, 11, 15 |
| 5.6 The Eigenvalue/Eigenvector Problem | 3, 5, 7, 11, 15, 20, 29, 32, 36, 37 |
| 5.7 General results for Eigenvalues and Eigenvectors | 1, 5, 13, 15, 17, 19, 26, 27 |
| 5.8 Diagonalization | 1, 5, 9, 15, 17, 21, 25 |
| 5.9 An Introduction to the Matrix Exponential Function | 1, 2, 3, 7, 11 |
| 5.10 Orthogonal Diagonalization and Quadratic Forms | 1, 5, 11, 13, 15, 19 |
| 5.11 Jordan Canonical Forms | 1, 3, 5, 11, 12, 17, 19 |
| 5.12 Chapter Review | |

Ch. 6 Linear Differential Equations of Order n

| Section | Assignment |
|--|---|
| 6.1 General Theory for Linear Differential Equations | 2, 3, 5, 7, 9, 11, 13, 16, 17, 21, 23, 25, 27 |
| 6.2 Constant-Coefficient Homogeneous Linear Differential Equations | 5, 7, 11, 15, 17, 20, 29, 30, 32, 33, 40 |
| 6.3 The Method of Undetermined Coefficients: Annihilators | 1, 3, 7, 13, 17, 21, 23 |
| 6.4 Complex-Valued Trial Solutions | 1, 2, 5, 6 |
| 6.5 Oscillations of a Mechanical System | 1, 5, 9, 13, 17, 19, 23, 31 |
| 6.6 RLC Circuits | 1, 2, 3, 5 |
| 6.7 The Variation-of-Parameters Method | 1, 3, 5, 11, 23, 25 |
| 6.8 A Differential Equation with Nonconstant Coefficients | 3, 7, 9, 11, 15, 17 |
| 6.9 Reduction of Order | 1, 5, 7, 11, 13 |
| 6.10 Chapter Review | |

Ch. 7 Systems of Differential Equations

| Section | Assignment |
|--|------------------------------------|
| 7.1 First-Order Linear Systems | 1, 2, 5, 9, 11, 15, 17 |
| 7.2 Vector Formulation | 1, 3, 7, 9, 13 |
| 7.3 General Results for First-Order Linear Differential Systems | 1, 5 |
| 7.4 Vector Differential Equations: Nondefective Coefficient Matrix | 1, 5, 7, 9, 13, 17, 19, 22, 23, 24 |
| 7.5 Vector Differential Equations: Defective Coefficient Matrix | 1, 3, 5, 9, 15 |
| 7.6 Variation-of-Parameters for Linear Systems | 1, 3, 7, 10 |

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| 7.7 Some Applications of Linear Systems of Differential Equations | 3, 9, 11 |
| 7.8 Matrix Exponential Function and Systems of Differential Equations | 1, 3, 5, 9 |
| 7.9 The Phase Plane for Linear Autonomous Systems | 1, 3, 7, 13, 21, 23 |
| 7.10 Nonlinear Systems | 1, 5, 7, 9 |
| 7.11 Chapter Review | |

Ch. 8 The Laplace Transform and Some Elementary Applications

| Section | Assignment |
|---|--|
| 8.1 Definition of the Laplace Transform | 1, 3, 5, 9, 11, 13, 15, 19, 23, 25, 29, 31, 33, 35, 36 |
| 8.2 The Existence of the Laplace Transform and the Inverse Transform | 1, 3, 5, 7, 9, 15, 19 |
| 8.3 Periodic Functions and the Laplace Transform | 1, 3, 7 |
| 8.4 The Transform of Derivatives and Solution of Initial-Value Problems | 1, 5, 9, 11, 17, 21, 25, 29 |
| 8.5 The First Shifting Theorem | 3, 5, 7, 13, 14, 19, 23, 29, 30, 37, 43, 51 |
| 8.6 The Unit Step Function | 1, 3, 7, 13 |
| 8.7 The Second Shifting Theorem | 1, 3, 7, 9, 13, 17, 23, 27, 31, 35 |
| 8.8 Impulsive Driving Terms: The Dirac Delta Function | 1, 3, 7, 11, 13 |
| 8.9 The Convolution Integral | 1, 3, 9, 11, 15, 21, 23, 25, 27 |
| 8.10 Chapter Review | |

Ch. 9 Series Solutions to Differential Equations

| Section | Assignment |
|---|---------------------|
| 9.1 A Review of Power Series | 1, 3, 5, 7, 9, 11 |
| 9.2 Series Solutions about an Ordinary Point | 1, 5, 9, 11, 13, 15 |
| 9.3 The Legendre Equation | 1, 2, 3, 7 |
| 9.4 Series Solutions about a Regular Singular Point | 1, 3, 5, 9, 13 |
| 9.5 Frobenius Theory | 1, 5, 11, 13, 19 |
| 9.6 Bessel's Equation of Order p | 1, 2, 3, 4, 5 |
| 9.7 Chapter Review | |

Useful Websites:

<http://integrals.wolfram.com/>

<http://www.calculus.org/>

<http://www.math.montana.edu/frankw/ccp/multiworld/topic.htm>

<http://faculty.eicc.edu/bwood/ma220supplemental/ma220supplemental.html>