

# MATH 240 – Differential Equations

## MATH 240 · SUGGESTED HOMEWORK · FALL 2019

| Section                                   | Exercises   |
|---|---|
| § 1.1: Background                         | 1-12 (if non-linear, why?) 13,15  |
| § 1.2: Solutions & Initial Value Prob     | 2,3,6,7,8,9,11,17,18,22,23,25,27  |
| § 1.3: Direction Fields                   | 1,3,5,10(a-c),11,15,17,19 (for 11-18, see our "Extras page" and use dfield) |
| § 1.4: Euler's Method                     | 1,5,7,11,15   |
| § 2.2: Separable Equations (I)            | 3,5,6,7,9,11,12,15,18,19,21,23  |
| § 2.2: Separable Equations (II)           | 13, 22,25   |
| § 2.3: Linear Equations (I)               | 1,3,4,5,7,11,17   |
| § 2.3: Linear Equations (II)              | 15,16,18,20,22,28, READ: 36   |
| § 2.4: Exact Equations (I)                | 1,2,7,9,11,12,13,16,22,23,25 FIX  |
| § 2.4: Exact Equations (II)               | 1,2,7,9,11,12,13,16,22,23,25  |
| § 2.6: Substitutions and Trans (I)        | 1,2,5,6,7,8,9,10,13 ( $t > 0$ ), 18,23,25,27                                |
| § 2.6: Substitutions and Trans (II)       | Get caught up.  |
| Chapter 2 Review                          | Chapter 1 & 2 Review Worksheet  |
| § 3.2: Mathematical Modeling              | Handout Problems & continue Chapter 1 & 2 Review Worksheet; Get caught up   |
| § 3.2: Compartmental Analysis             | 1, 4,7,8 & § 2.3: 35  |
| § 3.4: Newtonian Mechanics                | 1,5,7 (you will need a calculator for these)                                |
| Exam 1                                    |   |
| § 4.1: Introduction to Linear 2nd Order   | 2b, 5   |
| § 4.2: Second Order Linear Equations      | 1,5,13,15   |
| § 4.2: Second Order Linear Equations (I)  | 7,17,19,22, 39, (27,29 use any method to determine L.D.)                    |
| § 4.2: Second Order Linear Eqns (II)      | (28,31 use any method to determine L.D.), 37                                |
| § 4.3: Auxiliary Eqns; Complex Roots (I)  | 1,3,9,11,17,21,22,24  |
| § 4.3: Auxiliary Eqns; Complex Roots (II) | 26,29, 31(a-c), 32a, 33a  |
| § 4.4: Nonhomogeneous Equations (I)       | 1-8,13,14,15,16,18,27   |
| § 4.4: Nonhomogeneous Equations (II)      | 17,21,24, 29  |
| § 4.5: The Superposition Principle (I)    | 3,8,10,11,12,15   |
| § 4.5: The Superposition Principle (II)   | 17,21,24,25,27,33,35  |
| § 4.6: Variation of Parameters (I)        | 1,2,3,7,14  |
| § 4.6: Variation of Parameters (II)       | 11,15,17  |
| § 4.7: Variable-Coefficient Equations (I) | 5-8, 11,13,19   |

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| Section                                    | Exercises  |
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| § 4.7: Variable-Coefficient Equations (II) | 1,2, 24(a,b), 45,47, 37,39   |
| § 4.7: Variable-Coefficient Equations(III) | 40,41,43,48  |
| § 4.9: A Closer Look at Free Vibrations    | 1,3,5,9,12,18  |
| Chapter 4 Review Problems:                 | 1,3,7,9,11,21,25,30,31,35,38   |
| Exam 2                                     |  |
| § 9.1: Systems Intro                       | 1,3,5,7,11   |
| § 9.2: Linear Algebra Review               | 1,3,7,12   |
| § 9.3: Matrix Methods and Vectors          | READ SECTION 9.3; work: 1,4,5,21,23,25 Note, we will not be finding inverses |
| § 9.3: Matrix Methods and Vectors          | 27,33,34,35,37,39  |
| § 9.5: Eigenvalues/Eigenvectors            | 3,5,7,10   |
| § 9.4: Linear Systems in Normal Form (I)   | 1,3,5,7,9,11,21,24,26  |
| § 9.4: Linear Systems in Normal Form (II)  | Get caught up  |
| § 9.5: Homogeneous Linear Systems (I)      | 11,13,15,31,32   |
| § 9.5: Homogeneous Linear Systems (II)     | 14 ( Get caught up)  |
| § 9.6: Linear Sys Complex Eigenvals (I)    | 1,3,13,14  |
| § 9.6: Linear Sys Complex Eigenvals (II)   | Handout ( Get caught up)   |
| Exam 3                                     |  |
| § 5.4: Intro to the Phase Plane (I)        |  |
| § 5.4: Intro to the Phase Plane (II)       |  |
| Qualitative Methods                        | Handout Problems   |
| Final Exam                                 |  |