Chapter 2 Objectives

2.1 A Collection of Mathematical Models
- Understand how differential equations are obtained from conceptual models. (1, 5, 7, 14, 16)
- Be able to nondimensionalize mathematical models. (5, 7)
- Be able to interpret mathematical results of mathematical models. (7, 14, 16)

2.2 Separable First-Order Equations
- Be able to recognize and solve separable equations. (all)
- Be able to determine the interval of existence of solutions of initial-value problems. (14, 15, 17, 23)
- Be able to solve equations by change of variables leading to separable equations. (39)

2.3 Slope Fields
- Understand the connections between slope fields and solution curves. (all)
- Understand the connections between zero-isoclines and properties of the solutions. (7, 11, 13, 21)

2.4 Existence of Unique Solutions
- Be able to use Theorem 2.4.1 to show that a problem has a unique solution. (1, 3, 7, 13, 14, 15)
- Be able to use Theorem 2.4.2 to determine the guaranteed interval of existence for the solution of a linear problem. (11)
- Be able to solve differential equations by change of variables to a familiar equation. (19)

2.5 Euler’s Method
- Understand the connections between the slope field and Euler’s method.
- Be able to compute solutions using Euler’s method. (3, 7, 10)
- Be able to interpret strange results obtained by numerical methods. (10)

2.6 Runge-Kutta Methods
- Be able to compute solutions using the modified Euler method. (3, 6)