

# Summer 2007 Math 331: Week 2

## Section 1.8 Linear Equations

Key concepts:

- Recognize linear differential equations
- The linearity principle for the homogeneous case and the extended linearity principle for the nonhomogeneous case.
- Solving linear differential equations (the “lucky guess”).

Important Models:

- Financial Models

**Section 1.8, Exercises** 1 - 12, 20, 29, 30, 31.

## Section 1.9 Integrating Factors for Linear Equations

Key concepts:

- The idea behind the method: the product rule
- Finding the integrating factor
- Solving linear differential equations

Important Models:

- Mixing problems

**Section 1.9, Exercises** 1 - 12, 19, 20, 23, 24 - 27.

## Section 1.3 Qualitative Technique: Slope Fields

Key concepts:

- Sketching slope fields
- Special cases  $y' = f(t)$  and  $y' = f(y)$
- (Skip RC Circuits)

**Section 1.3, Exercises** 1 - 10, 12 - 18 (the numbering is the same in the 2nd ed.)

## Section 1.4 Numerical Technique: Euler’s Method

Key concepts:

- Euler’s method for approximating the solution of the initial value problem  $y' = f(t, y)$ ,  $y(t_0) = y_0$  is defined recursively as  $t_{k+1} = t_k + \Delta t$ ,  $y_{k+1} = y_k + f(t_k, y_k)\Delta t$ ,  $k = 0, 1, 2, \dots$

**Section 1.4, Exercises** 1 - 9 (the numbering is the same in the 2nd ed.)