

Week 3

Math 0290 *Differential Equations* - RUBIN - Winter/Spring '09

DUE DATE: The homework problems from this handout are due at the end of the quiz on **Monday, January 26th**. This includes the following **MATLAB homework**: Chapter 3 of MATLAB book, pg. 43-44, exercises # 2, 6, 9.

TOPICS: This week, we focus on a few specific applications of first order differential equations.

Section 3.1: Population Growth - key concepts:

- growth rate, birth rate, death rate
- Malthusian model (exponential growth)
- logistic model, carrying capacity
- qualitative analysis of a 1st order equation

homework: pg. 114-116, # 3, 10, 12, 16.

Section 3.3: Personal Finance - key concepts:

- continuous compounding yields exponential growth
- withdrawals and deposits

homework: pg. 126, # 3, 4, 5.

Section 3.4: Electrical Circuits - key concepts:

- inductor, capacitor, resistor, voltage source
- Ohm's law + Faraday's law + capacitance law + Kirchoff's voltage law yield an ODE for current (first order if no capacitor is present, otherwise second order) or charge (if no inductor is present)

homework: pg. 131, # 4, 11.