Topics for Exam 2

1. **Solving First Order Linear Differential Equations**

   (a) Method of Integrating Factor

   (b) Integration by parts.

2. **Solving the Logistic Equation**

   (a) Existence and Uniqueness.

   (b) Partial Fractions.

3. **Linear Approximations**

   (a) Linear approximation to a differentiable function.

   (b) Error in the linear approximation.

4. **The Principle of Linearized Stability**

   (a) Isolated equilibrium points; stability and asymptotic stability; unstable equilibrium point.

   (b) Principle of Linearized Stability

5. **Qualitative Analysis of First Order Equations**

   (a) Existence and uniqueness; global existence and long–term behavior.

   (b) Applications to population models for single species.

Relevant Sections in the Text and Class Lecture Notes: Section 4.6 in the text; Sections 4.8, 4.9, 5.1, 5.2 and 5.3 in the class lecture notes.

Relevant Assignments: 12, 13, 14, 15, 16, 17, 18 and 19.

Important Concepts: Linear approximation, linearized equation, equilibrium point, stability.

Important Skills: Know how to integrate by parts; know how to use partial fractions; know how to solve first linear differential equations; know how to use linear approximations to differentiable functions; know how to estimate the error in the linear approximation; know how to apply the principle of linearized stability.