1. This list is now in final form.

2. Test #1 is Friday 2/16/07.

3. The test will cover the material of Assignments #1 – #6. See also the topic list below.

4. You MUST have a simple scientific calculator for the exam. The moral equivalent of a TI-30: arithmetic, logarithms, exponentials, trig functions, inverse-trig functions, but no text-storage memory, no wireless capability, no graphing capability, and no computer-algebra system.

5. Topics to know about:

   (a) What is an ordinary differential equation?

   (b) What is a solution for a differential equation?

   (c) What is a solution for an initial-value problem?

   (d) What does it mean for a solution to live on some interval?

   (e) Calculus-I and -II derivatives and antiderivatives. arctan too.

   (f) The fish-story differential equation: how does it arise from a story about fish in a lake?

   (g) What is an equilibrium solution of a differential equation? And how do you spot equilibrium solutions?

   (h) What is an autonomous differential equation?

   (i) What is a first-order linear differential equation?

   (j) Solving a first-order linear differential equation via the integrating-factor trick.

   (k) Solving initial-value problems involving first-order linear differential equations.

   (l) What is the existence and uniqueness theorem for initial-value problems involving first-order linear differential equations?

   (m) How does the integral formula (2) on page 50 arise? Especially the definite-integral part.
(n) The separation-of-variables trick that works on some differential equations.

(o) What is the existence and uniqueness theorem for initial-value problems involving differential equations of form $y' = f(t, y)$?

(p) How to make a by-hand direction field by means of nullclines, isoclines, and equilibria. The state line for autonomous first-order differential equations.

(q) Given a direction field, can you tell whether it belongs to an autonomous differential equation?

(r) Can you set up a “mixing problem”?

(s) The function Step renders off-to-on and on-to-off phenomena.

(t) Can you instantly write down a solution to an equation which states that the time rate of change of some quantity is directly proportional to that quantity?