

Final form: Thu Feb 15 13:45:13 MST 2007 /m333.sp07/handouts333/t1_333_216/review_suggestions_1.tex

- 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 $\mathbf{y}' = \mathbf{f}(t, \mathbf{y})$?
- (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?