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1 This list is not in final form. Like, stuff may yet be added to it.

2 Test #1 is

Friday
9/23/05.

3 The test will cover the material of Assignments #1 – #7, roughly.

4 Review the following:

(a) Be able to tell whether a given function is a solution of a given differential equation.

(b) Be able to solve differential equations of form

$$\frac{dy}{dt} = f(t).$$

This is just an antiderivative problem such as you met in MATH170 or 175:

(i) $y' = \dfrac{1}{1+t^2}$

(ii) $y' = e^{-4t} - \sin(3t)$ (and the initial-value problem $y(0) = 3$).

(iii) $y' = \dfrac{1}{t}$ (and the initial-value problem $y(-5) = 3$).

(c) The fish with a constant growth rate and a constant harvesting rate provided our first example of a **First-Order Linear Differential Equation**.

(i) Be able to solve it. Like, be able to find formulas for solutions of associated initial-value problems.

(ii) Be conversant with the **equilibrium solution**.

(iii) Know the behavior of solutions which start below the equilibrium solution – how MATH-170 considerations drive this.

(iv) Know how solutions which start above the equilibrium solution behave.

Analogous considerations arise when we put the "overcrowding" term into the mix. Then there were **two** equilibrium solutions.

(d)

(e) What's an *autonomous* differential equation? What distinguishes the direction field of and autonomous differential equations from the direction field of a non-autonomous differential equation

(f)

(g) There just HAS to be a mixing problem.

(h) Example 1.3.3 provides a **separation-of-variables** example done more straightforwardly than in examples 2.5.1 and 2.5.2. Example 1.3.3 also provides an example of a non-autonomous differential equation with an equilibrium solution. See m below.

(i) Know the **Existence and Uniqueness Theorems** for solutions of initial-value problems involving

  (i) First-order linear differential equations.

  (ii) Differential equations of the form

$$\boldsymbol{y' = f(t, y)}$$

(j) On assignment #4, several of you used the Theorem 2.2.1 formula to handle and initial-value problem involving a differential equation which has discontinuous coefficients.

(k) What's a **nullcline**? What's an **isocline**. Can you use these "clines" to get a rough idea of where solution curve go?

(l) The important thing about the Predator-Prey system is the methods we used to infer the behavior of solutions.

(m) Watch out for the **Laws of Exponents** and the **Laws of Logarithms** in problems such as 2.5: 5, 6, 7 from assignment #7. This will help you get the integration constant to show up in the right place in your final answer.

(n)

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