TOPICS:

GET READY!

Test #1: Guaranteed Problems

1. Solve a linear equation.
   - $\rightarrow$ Find homogeneous, particular, and general solutions.
   - $\rightarrow$ Use initial data.
   - $\rightarrow$ "Analyze" the solution.
2. Work with a model.
   - $\rightarrow$ Build the ODE from scratch.
   - $\rightarrow$ *Explain why* you do what you do.
3. One "challenging" problem.

(Look at the sample tests on the Web)

Summary: Linear Equations

- General Solution = Homogeneous + Particular Solution
- Find a Homogeneous Solution
  - $\hookrightarrow$ Separate and Integrate
  - $\hookrightarrow$ C.E. for constant coefficients
- Find a Particular Solution
  - $\hookrightarrow$ Vary Your Parameters
  - $\hookrightarrow$ Undetermined Coefficients

Sample Problem:

Sketch solution curves for

$$P' = aP - sP^2$$

(a) Find the steady state solutions.

(b) Determine where the solutions are increasing and where they are decreasing.

(c) Determine where the solution curves are concave up and where they are concave down.

(d) Describe the behavior of the solution for large values of the independent variable t.

Worcester Yeast Corporation

The yeast is grown in a very large vat, with plenty of food. Assume that, in the absence of harvesting, the rate of growth of this yeast is proportional to its present population and that the yeast population will double its size in 4 hours.

(a) Derive a model for the growth of the yeast population P (measured in kilograms) when the yeast is harvested at a constant rate H (kg/hour).

More WYC

- Balance Equation
- Rate In and Rate Out
- Take a Limit

Even More WYC

(b) What is the maximum amount of yeast that you will harvest in an 8 hour day if the initial yeast population is 100kg and you use a constant harvest rate?

(c) Is it possible to harvest more yeast?

Announcements:

- Review Session: Tuesday, 7:00pm in SL115
- Project Reports Due at 3:00pm on Tuesday: SH202A