DIFFERENTIAL EQUATIONS (ODEs)

MA 2051–C97

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TOPICS

- Business
- Terminology
- A Model
- Solve a Couple of Examples

GRADE SCHEME

- 2 Tests ..... 200 points
- Homework ..... 100 points
- 2 Projects ..... 100 points

- Total ..... 400 points

Recommended Problems

MODELING CYCLE

Formulate

Analyze

Interpret

TERMINOLOGY:

- ODE
  - dependent variable, independent variable
  - parameter
  - initial condition
- Solution
  - Test a Solution?

More Models:

Heat Loss: $\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots T'(t) = \gamma\left[T_{\text{out}} - T(t)\right]$

Population: $\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots P'(t) = aP - sP^2$

Damped Spring: $\ldots\ldots\ldots\ldots\ldots\ldots\ldots y'' + by' + ky = F(t)$

Free Fall: $\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \dfrac{dv}{dt} = -g$

SOLUTIONS:

$$x''(t) + \omega^2 x(t) = 0$$

Add Initial Conditions:

Simple and Separable

Example #1:

$$\frac{dx}{dt} = \cos(t)$$

Simple and Separable

Example #2:

$$P'(t) = 0.0012P(t), \quad P(1900) = 76.09$$