

Your mid-term is on 3/4/2013.

## Definitions

computational science modeling continuous time discrete time dynamic model static model deterministic model stochastic model absolute error relative error normalized exponential notation derivative antiderivative definite integral indefinite integral ordinary variable stock variable derived variable flow variable differential equations difference equations half-life floating point number integer number significand base exponent significant digits precision rounding error truncation error overflow underflow big-oh notation (for error of numerical approximations) probability density function probability mass function cumulative density function discrete random variable continuous random variable mean median mode expected value variance standard deviation

## Longer Concepts

Steps of the modeling process Sources of errors Identifying causes of floating point errors Rate of change (average and instantaneous) Total change (integration) Diagramming systems models (identifying parts and creating diagrams) Solving differential equations analytically Basic mechanics of a falling object (forces involved, concepts of solution) Competition for resources model (Shark competition) Numerical differentiation Floating point representation Integer representation Euler's method (and its error characteristics) Runge-Kutta 2 (and its error characteristics) Runge-Kutta 4 (and its error characteristics) Polynomial equations (and their roots) Discrete distributions (and specific ones given in class) Continuous distributions (and specific ones given in class)

## Python Concepts

lists tuples dictionaries functions classes methods data and class attributes arguments keyword arguments inheritance PEP 8 copies vs views (of lists or numpy arrays, for example) mutability slicing control flow tools (if/else statements, including break and continue statements, loops) docstrings