Welcome to Math 275
Ordinary Differential Equations
Required Materials


By Blanchard, Devaney, and Hall.
Required Materials

- DETools software
- Internet, Email, and computer/printer access
- Prerequisite: Math 253 (Calculus III) or equivalent
- Student Solutions Manual
A NOTE ON CALCULATORS.

Use them ONLY AS APPROPRIATE!!

Remember, calculators only produce APPROXIMATE results.

For example, $\sqrt{2} \neq 1.414213562$. If something like $\sqrt{2}$ appears in your calculations, carry it as the symbol $\sqrt{2}$. It is EXACT!

Replacing $\sqrt{2}$ with an approximation, unless you are asked to do so, is INCORRECT!
Course Content

- Chapter 1 – 1\textsuperscript{st} Order Differential Equations
- Chapter 2 – 1\textsuperscript{st} Order Systems
- Chapter 3 – Linear Systems
- Chapter 4 – Forcing and Resonance
- Chapter 5 – Non-linear Systems
Course Website

Main page URL …

http://www.smcccd.net/accounts/reuterdahlt/
Leonhard Euler

Born: 15 April 1707 in Basel, Switzerland
Died: 18 Sept 1783 in St Petersburg, Russia

| Math 275 | Differential Equations |
Math 275 - Differential Equations

Updated: June 15, 2014

Johann Carl Friedrich Gauss

Born: 30 April 1777 in Brunswick, Duchy of Brunswick (now Germany)
Died: 23 Feb 1855 in Göttingen, Hanover (now Germany)

Assignments

Week # 1  6/17
Week # 2  6/24
Week # 3  7/01
Week # 4  7/08
Week # 5  7/15
Week # 6  7/22
Week # 7  7/31

Selected Homework Problems
DE Homework Police!
DETools

- Required for all qualitative analysis
- DETools menu page …
Differential Equations

AmplitudeAndPhase
BeatsAndResonance
ButterflyEffect
ChemicalOscillator
CompetingSpecies
DESketchPad
Duffing
EulersMethod
EulersMethodForSystems
FirstOrderExamples
ForcedMassSpring
GraphingSolutionsQuiz
HMSGlider
HPGLinearizer
HPGSolver
HPGSystemSolver
LinearPhasePortraits
LorenzEquations
MassSpring
MatrixFields
Pendulums
PendulumSensitiveDependence
PhaseLines
PredatorPrey
RLCCircuits
TargetPractice
TDAnimation
TDAnimationQuiz
VanderPol

Browse All Tools

Help  Manage Tool Lists  Exit
DETools ... check out

- HPG Solver
- HPG System solver
- Euler’s Method
- Phase Lines
$\frac{dy}{dt} = y - t$

$\min y = -3, \max y = 3$
$\min t = -5, \max t = 5$
$y_0 = -2.72, t_0 = -3.68$
$\Delta t = 0.05$
\[
\begin{align*}
\frac{dx}{dt} &= y \\
\frac{dy}{dt} &= -x - 0.3y
\end{align*}
\]

<table>
<thead>
<tr>
<th>min x</th>
<th>max x</th>
<th>min y</th>
<th>max y</th>
<th>min t</th>
<th>max t</th>
<th>x₀</th>
<th>y₀</th>
<th>t₀</th>
<th>δt</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>4</td>
<td>-4</td>
<td>4</td>
<td>0</td>
<td>25</td>
<td>3.433</td>
<td>-2.567</td>
<td>0</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Clear | Hide Field

Clear | Overlay Time Graphs

Runge Kutta 4 | Draw Solutions

Draw Vectors

Solution | Equations
method & step
- Euler 1
- Euler 0.5
- Euler 0.25
- Euler 0.125
- RK4 0.125
- Compare All

t =
y =
dy/dt =

t₀ = 0.16
y₀ = 3.6
dy/dt = 2y + 1
\[ y_0 = \]

\[ \frac{dy}{dt} = y(1 - y) - a \]
Let’s get started ...