

Solving ODEs using Euler Methods

Talk to a Teacher Project

<http://spoken-tutorial.org>

National Mission on Education through ICT

<http://sakshat.ac.in>

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Objectives

At the end of this tutorial, you will learn how to:



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- **Solve ODEs using Euler and Modified Euler methods**



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- **Solve ODEs using Euler and Modified Euler methods**
- **Develop Scilab code to solve ODEs**



System Requirements

- OS: Ubuntu Linux 12.04



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- **Scilab 5.3.3**



Prerequisites

- **Basic knowledge of Scilab**



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- Know to solve ODEs



Prerequisites

- Basic knowledge of Scilab
- Know to solve ODEs
- Please refer to the relevant Scilab tutorials available on <http://spoken-tutorial.org>



Euler Method

- **Get accurately approximate solution**



Euler Method

- **Get accurately approximate solution**
- **Solve Initial Value Problems where initial values are given**



Euler Method

- Get accurately approximate solution
- Solve Initial Value Problems where initial values are given
- Solve Continuous function



Example

- IVP $y' = -2t - y$



Example

- **IVP** $y' = -2t - y$
- $y(0) = -1$



Example

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- **step length 0.1**



Example

- **IVP** $y' = -2t - y$
- $y(0) = -1$
- **step length** 0.1
- **Find** $y(0.5)$



Modified Euler Method

- Second order method



Modified Euler Method

- Second order method
- Stable, two step method



Modified Euler Method

- Second order method
- Stable, two step method
- Find average at beginning and end of time step



Example

- $y' = t + y + ty$



Example

- $y' = t + y + ty$
- $y(0) = 1$ **with** $h = 0.01$



Example

- $y' = t + y + ty$
- $y(0) = 1$ **with** $h = 0.01$
- **Use Modified Euler's method to solve for $y[0.1]$**



Summary

In this tutorial, we have learnt to:

- **Develop Scilab code for Euler and Modified Euler methods**
- **Solve an ODE**



About the Spoken Tutorial Project

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- Conducts workshops using spoken tutorials
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- More information on this Mission is available at

<http://spoken-tutorial.org/NMEICT-Intro>

