

# Numerical solution of ordinary differential equations

Chapman & Hall - The Numerical Solution of Ordinary and Partial Differential Equations

**Problem-2: Ordinary Differential Equation (ODE)**

Use Euler's explicit numerical method to write a Matlab code to solve the linear first-order ODE given by

$$\frac{dy}{dt} = t - y, \quad y(0) = 1.$$

The exact analytical solution to the above ODE is given by

$$y = t - 1 + 2e^{-t}$$

This exact solution must be used to compare with the numerical solution obtained by Matlab code.

To solve this ODE, you need to create two m-files. The first is a general purpose function file named `Euler_forward_method.m` that solves any first-order ODE using Euler's explicit method. The second is a function file named `linear_ODE.m` that evaluates  $f(t,y)$  i.e. the right-hand side of the ODE specified in the problem statement. The name of the second function file is supplied to the first function.

The function `fsolve` can be used to pass the values of  $t$  and  $y$  to `linear_ODE.m` and calculate  $f(t,y)$  at the point  $(t,y)$ .

Description: -

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Great Britain -- History -- James I, 1603-1625

Differential equations -- Numerical solutions. Numerical solution of ordinary differential equations

- Numerical solution of ordinary differential equations

Notes: Includes bibliographical references (p. 452-460) and index.

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## Numerical solution of differential equations pdf

First, based on a novel word-of-mouth propagation model, we model the original problem as an optimal control problem. Two study cases are considered.

## Differential equation

Boundary- Value Problems and Methods 6.

## Numerical solution of ordinary differential equations GTU CVNM PPT

We'll need the new slope at this point, so we'll know where to head next.

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In this equation we have a way to determine the solution at position  $x$  and time  $t + Dt$  given that we know the solution at three positions,  $x$ ,  $x + Dx$ , and  $x + 2Dx$  at time  $t$ . The aim is to show the efficiency of the presented method and its advantage over other method.

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