

# Assignment 14

## CS374

Harsh Patel(201701021)

Viraj Patel(201701439)

Assigned by :

Prof. Arnab Kumar

November 7, 2019

# Contents

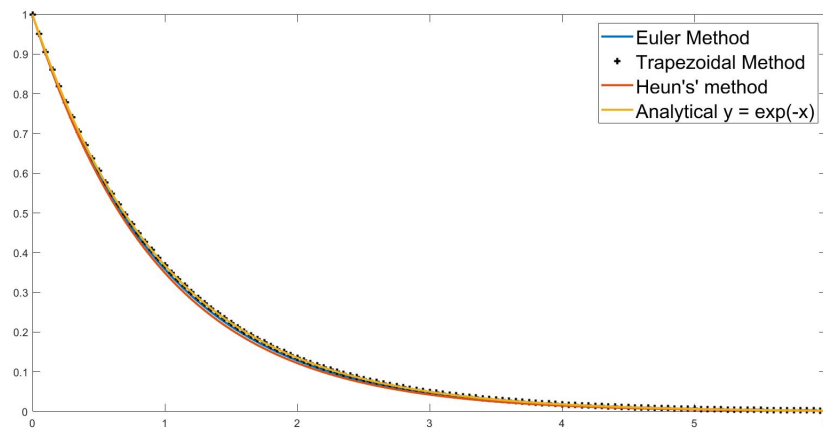
<b>1</b>	<b>Euler's, Trapezoidal and Heun's Method</b>	<b>3</b>
1.1	Question 1 . . . . .	3
1.1.1	$h = 0.2$ . . . . .	3
1.1.2	$h = 0.1$ . . . . .	4
1.1.3	$h = 0.05$ . . . . .	5
1.2	Question 2 . . . . .	6
1.2.1	$h = 0.2$ . . . . .	6
1.2.2	$h = 0.1$ . . . . .	8
1.2.3	$h = 0.05$ . . . . .	9

# 1 Euler's, Trapezoidal and Heun's Method

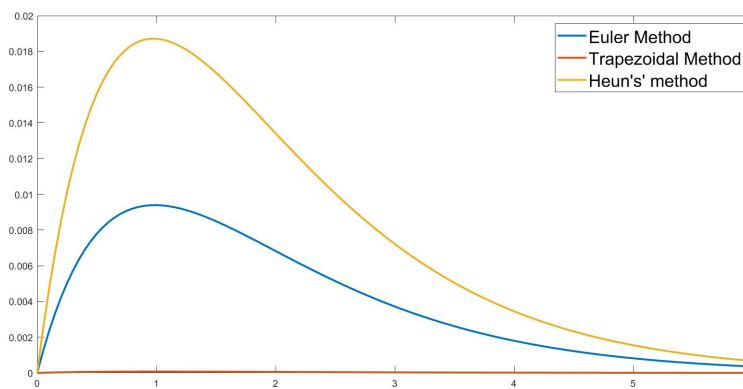
## 1.1 Question 1

$$Y'(x) = -Y(x); \quad Y(0) = 1 \quad (1)$$

### 1.1.1 $h = 0.2$

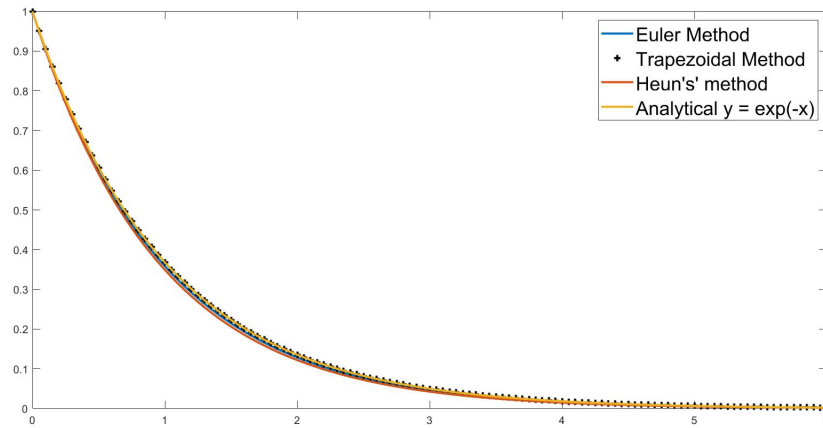


Plot of  $Y(x)$  derived from Euler's, Trapezoidal, Heun's and Analytical method for  $h = 0.2$

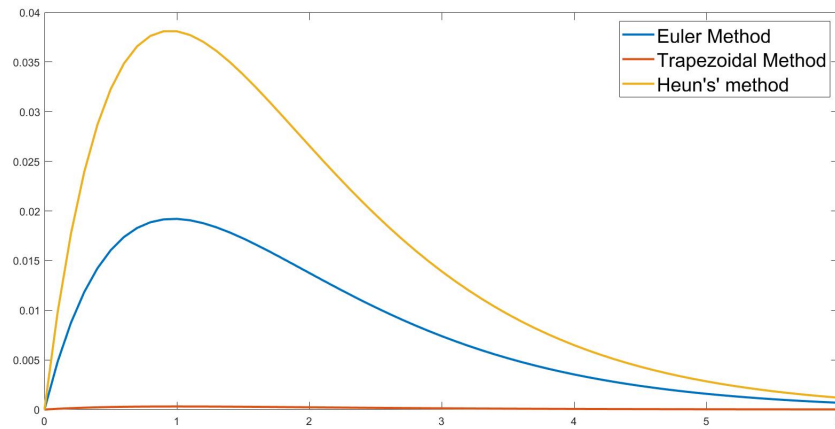


Plot of Error between  $Y(x)$  and different methods for  $h = 0.2$

### 1.1.2 $h = 0.1$

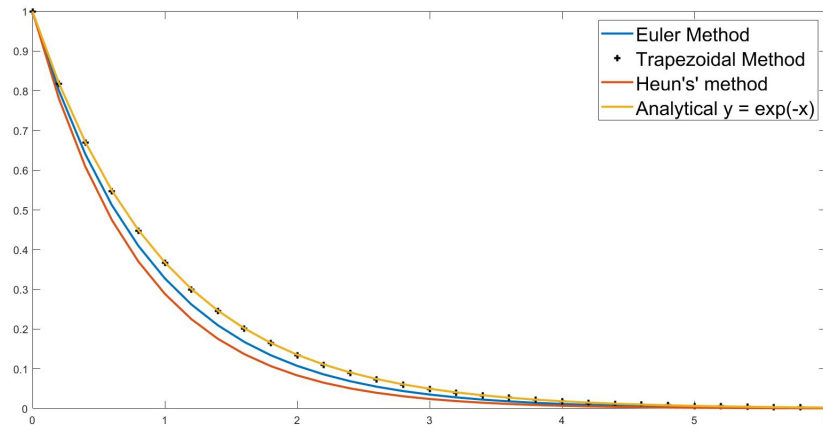


Plot of  $Y(x)$  derived from Euler's, Trapezoidal, Heuns and Analytical method for  $h = 0.1$

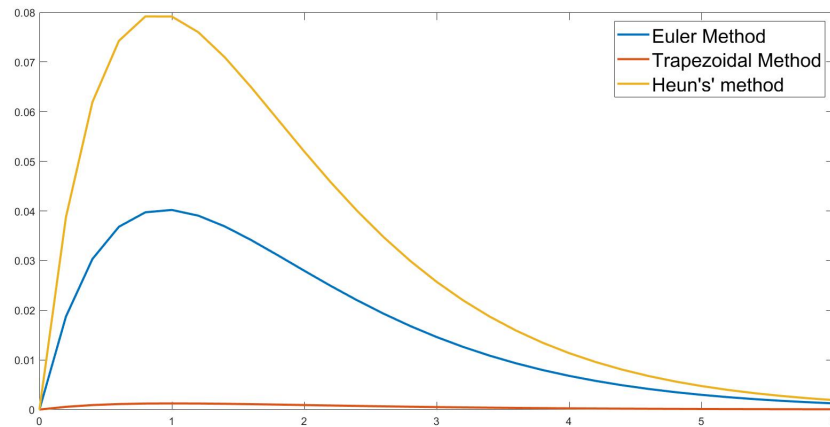


Plot of Error between  $Y(x)$  and different methods for  $h = 0.1$

### 1.1.3 $h = 0.05$



Plot of  $Y(x)$  derived from Euler's, Trapezoidal, Heun's and Analytical method for  $h = 0.05$

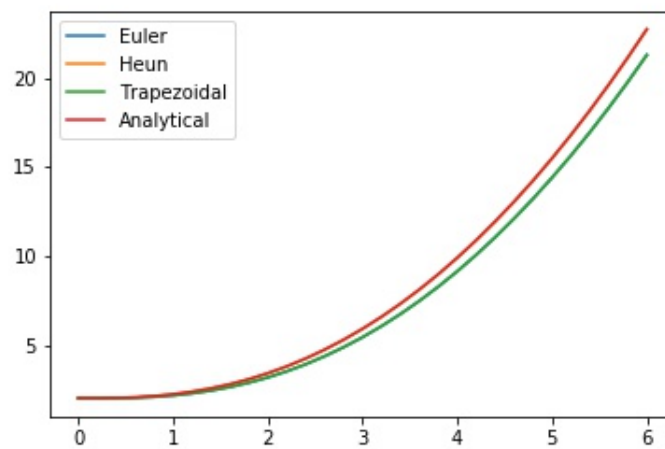


Plot of Error between  $Y(x)$  and different methods for  $h = 0.05$

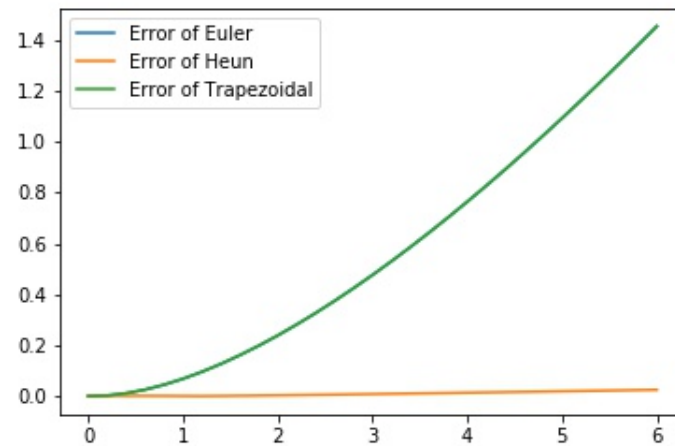
## 1.2 Question 2

$$Y'(x) = \frac{Y(x) + x^2 - 2}{(x + 1)}; \quad Y(0) = 2 \quad (2)$$

### 1.2.1 $h = 0.2$

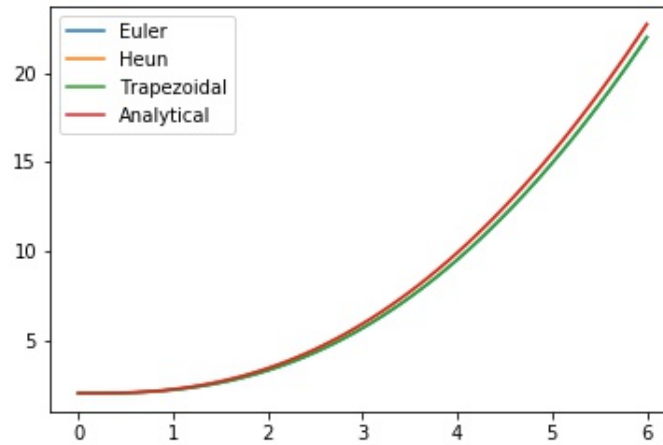


Plot of  $Y(x)$  derived from Euler's, Trapezoidal, Heun's and Analytical method for  $h = 0.2$

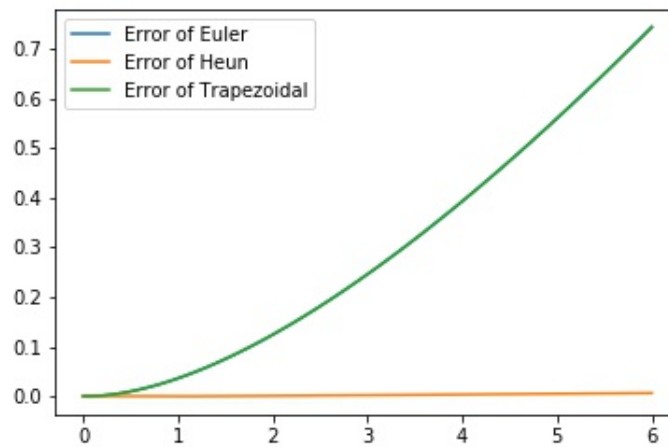


Plot of Error between  $Y(x)$  and different methods for  $h = 0.2$

### 1.2.2 $h = 0.1$



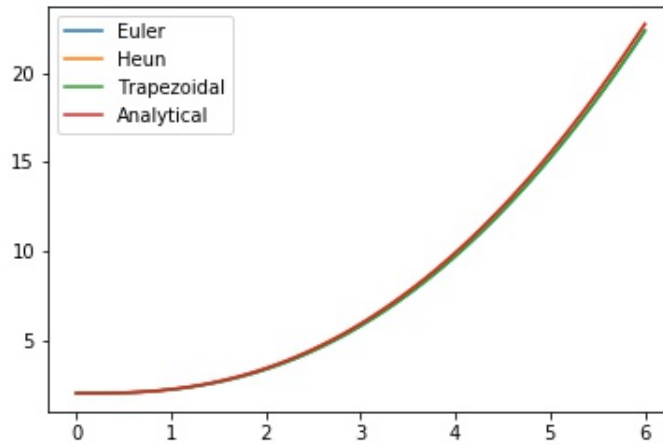
Plot of  $Y(x)$  derived from Euler's, Trapezoidal, Heun's and Analytical method for  $h = 0.1$



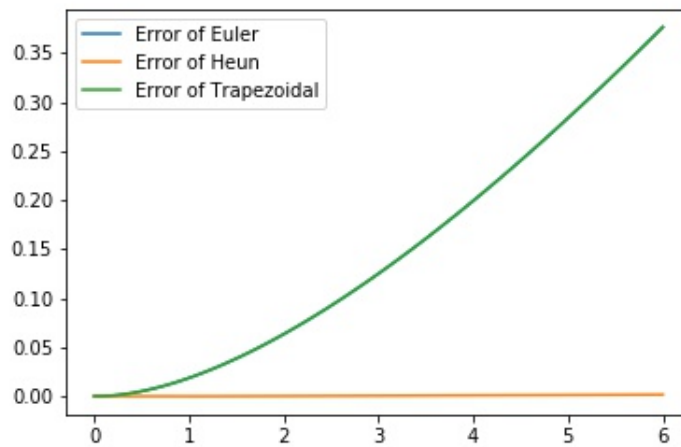
Plot of Error between  $Y(x)$  and different methods for  $h = 0.1$



### 1.2.3 $h = 0.05$



Plot of  $Y(x)$  derived from Euler's, Trapezoidal, Heuns and Analytical method for  $h = 0.05$



Plot of Error between  $Y(x)$  and different methods for  $h = 0.05$