

# **Assignment 3**

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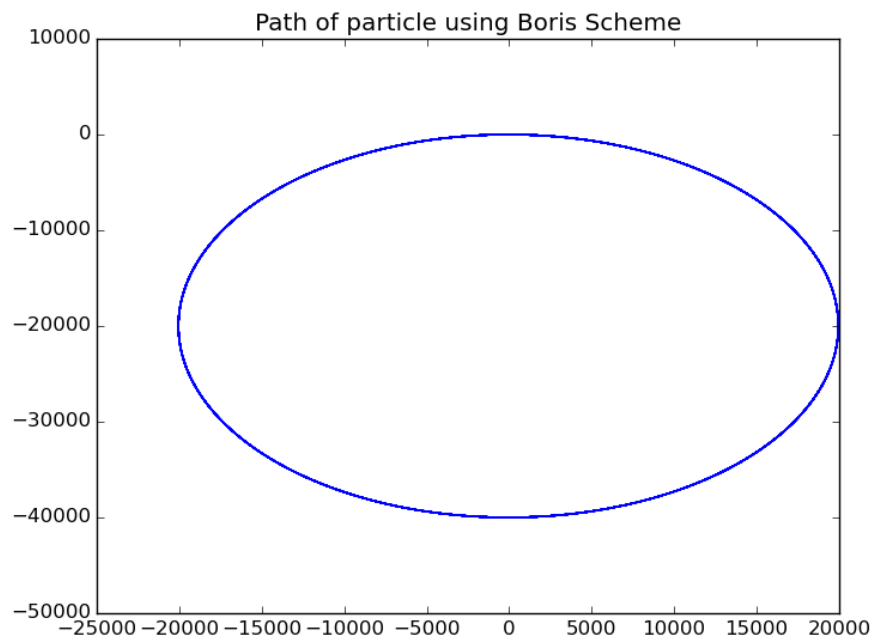
November 14, 2016

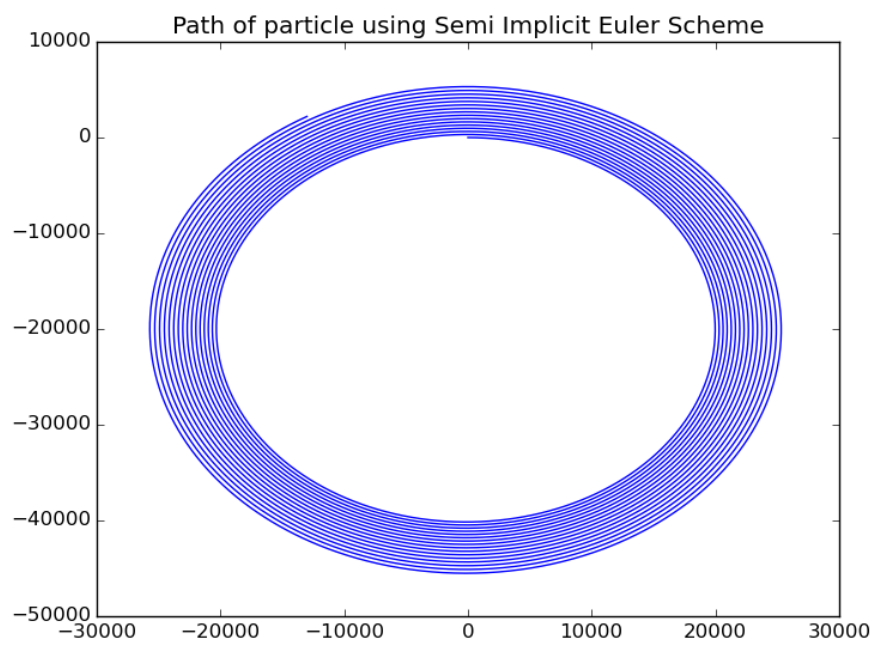
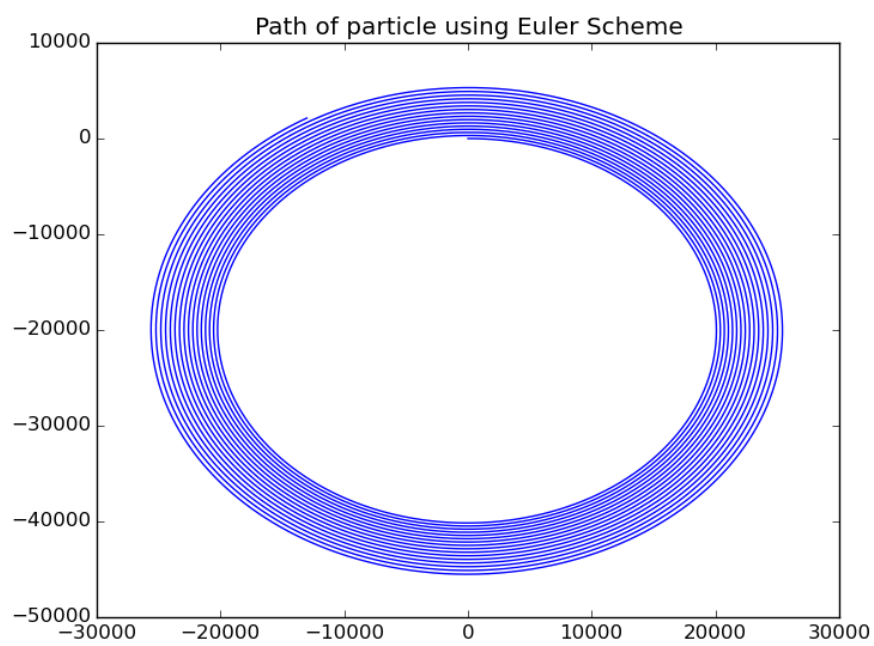
## 1 Question1:

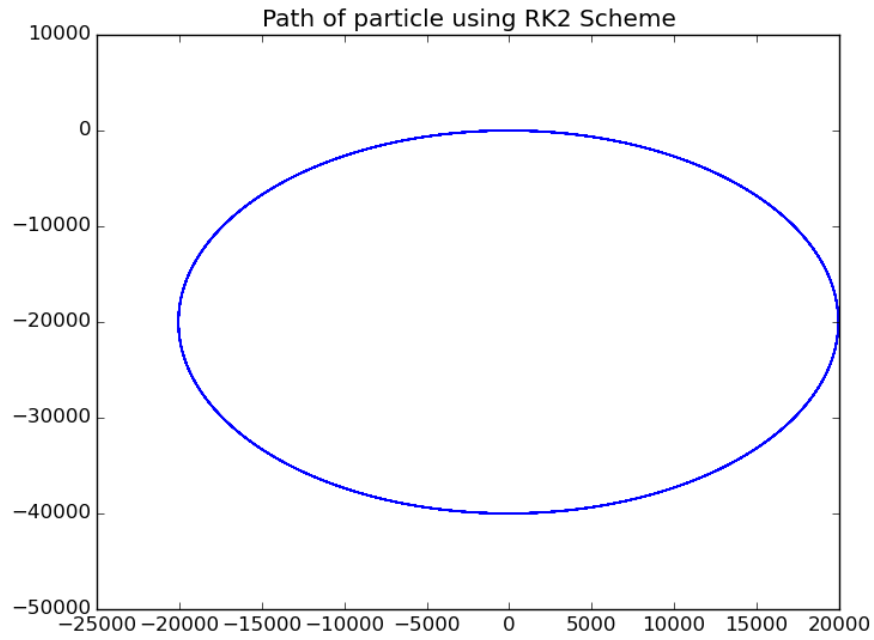
The following plots show the results of the simulation of a charged particle motion under the influence of a constant magnetic field and no electric field.

### 1.1 Paths using Different Schemes

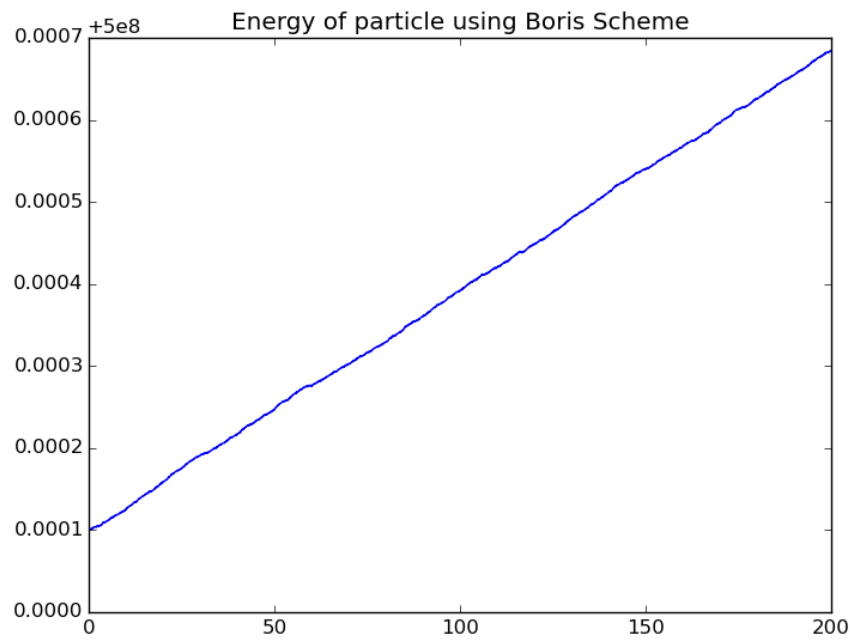
Refer code for the values used for the simulation.

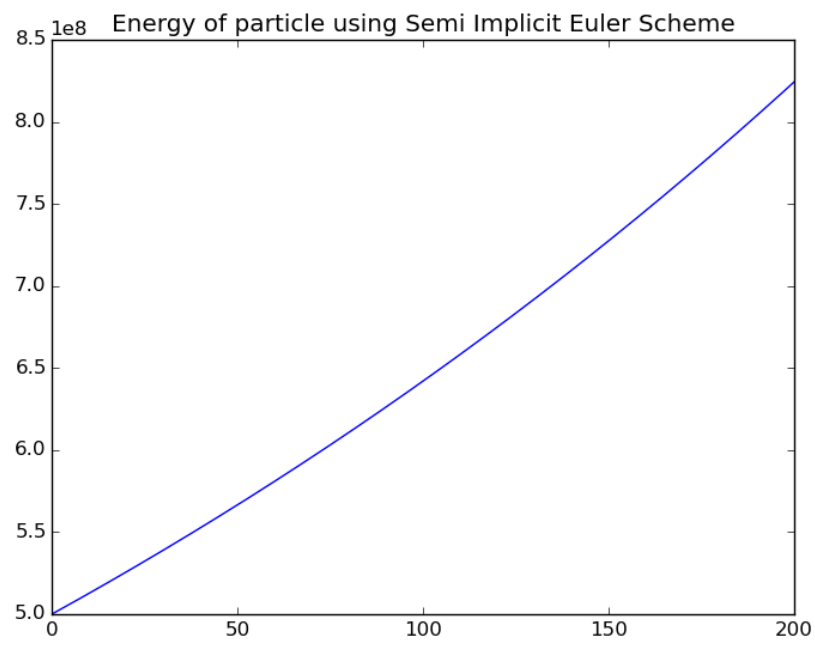
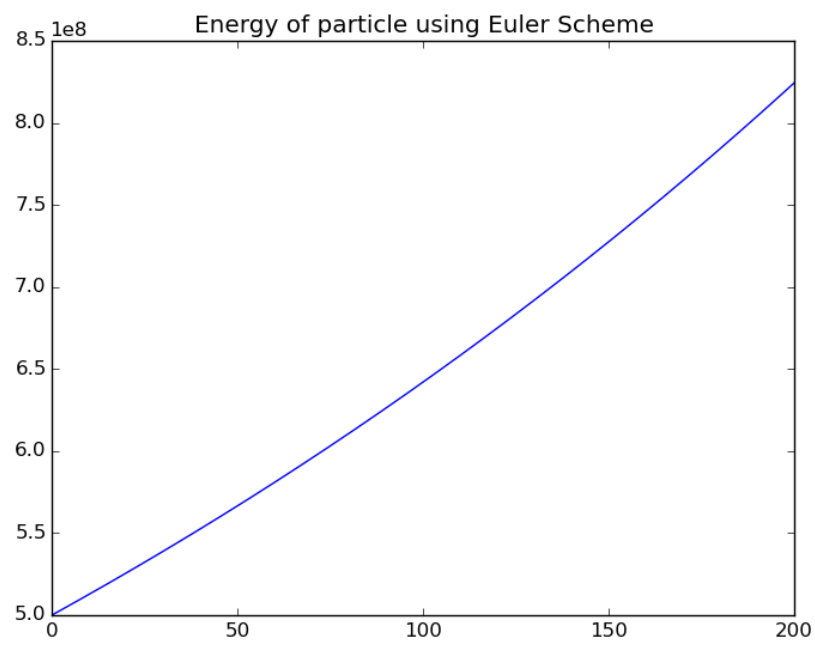


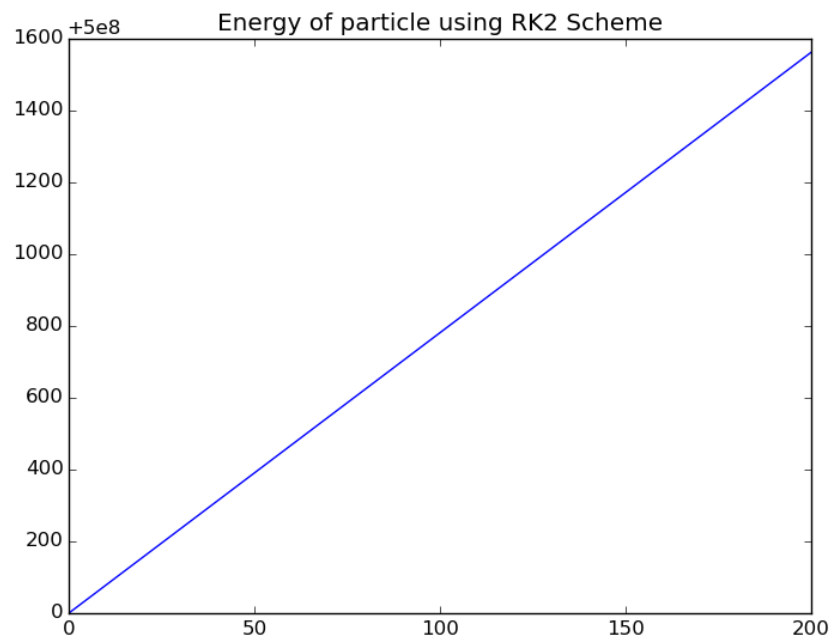




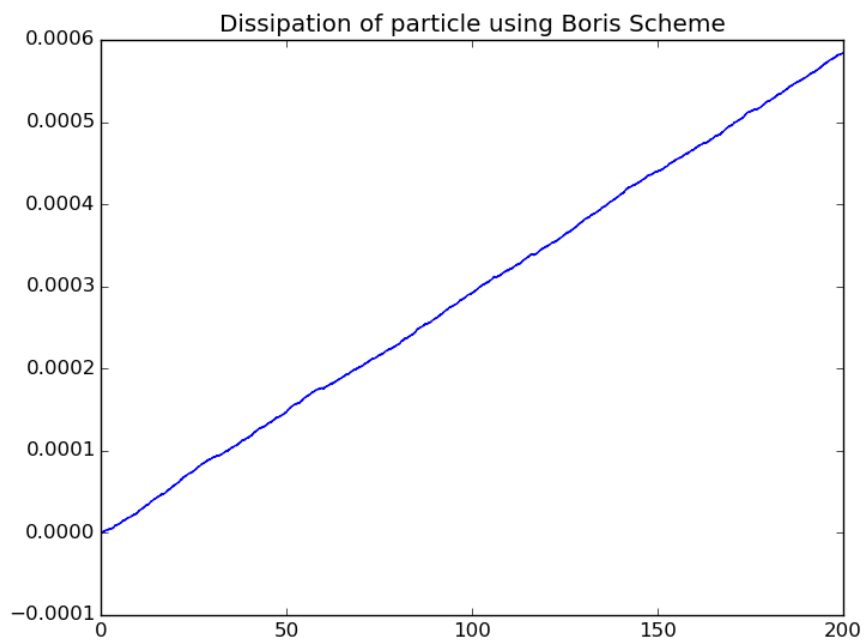
## 1.2 Energy Development with time using Different Schemes

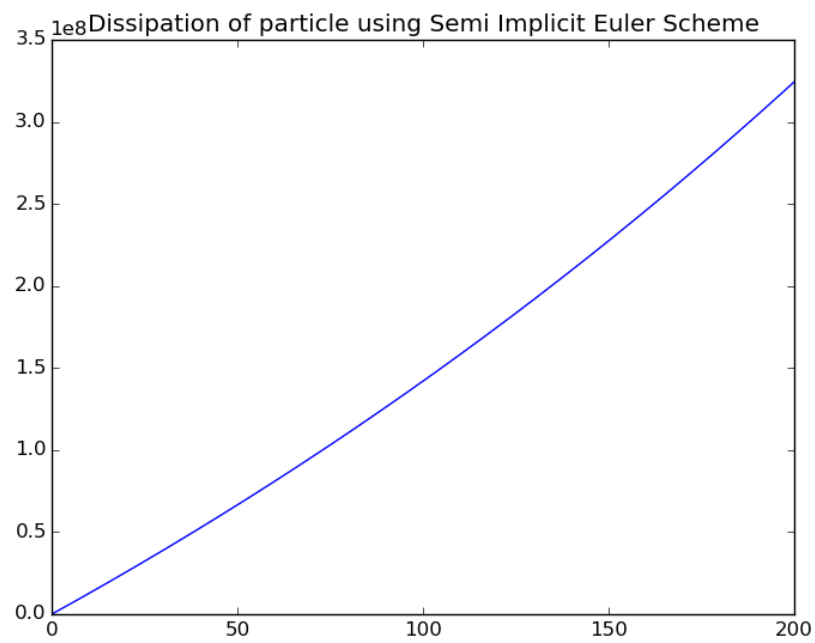
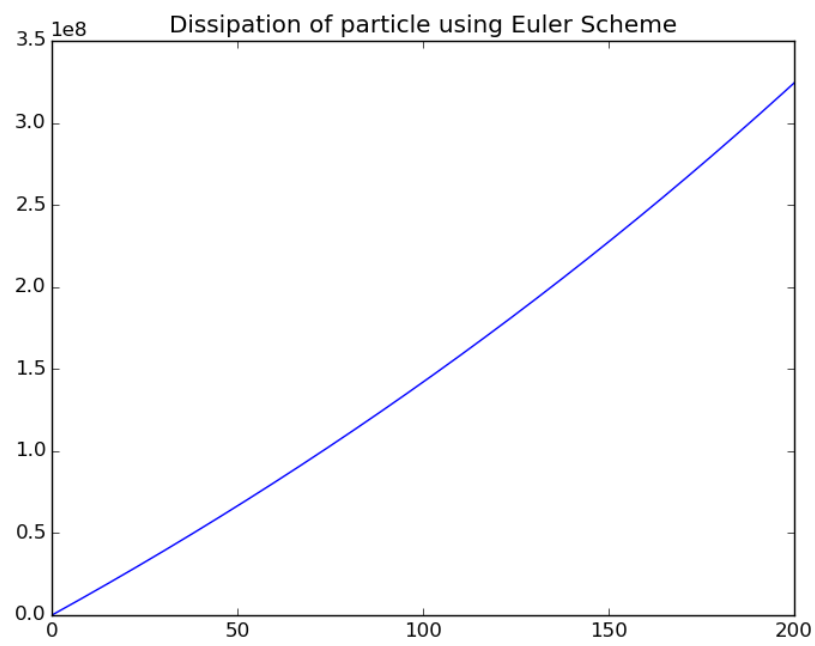


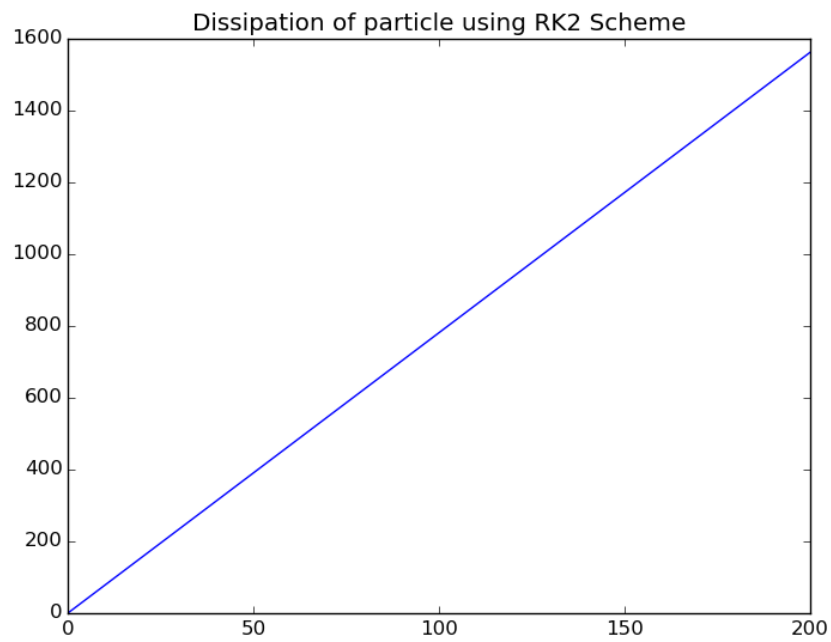




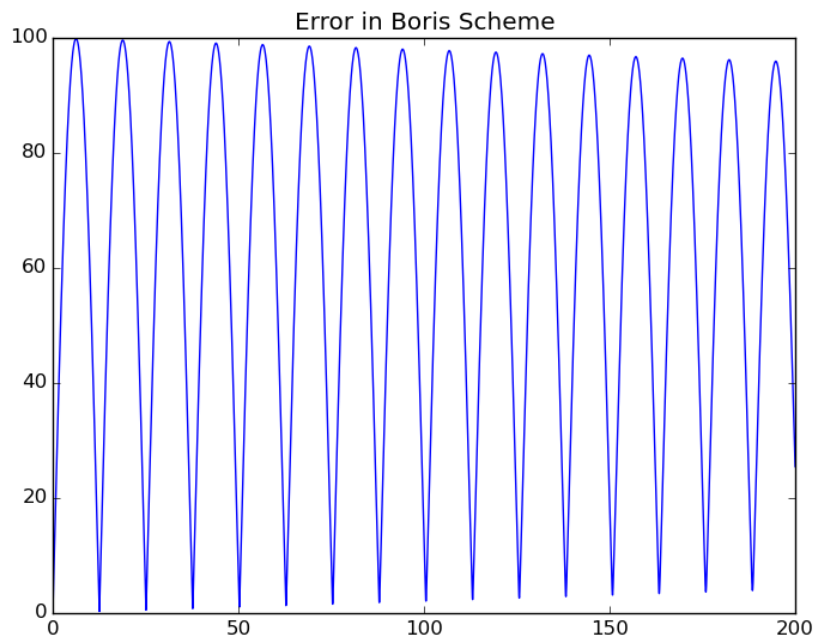
### 1.3 Dissipation of energy with time using Different Schemes



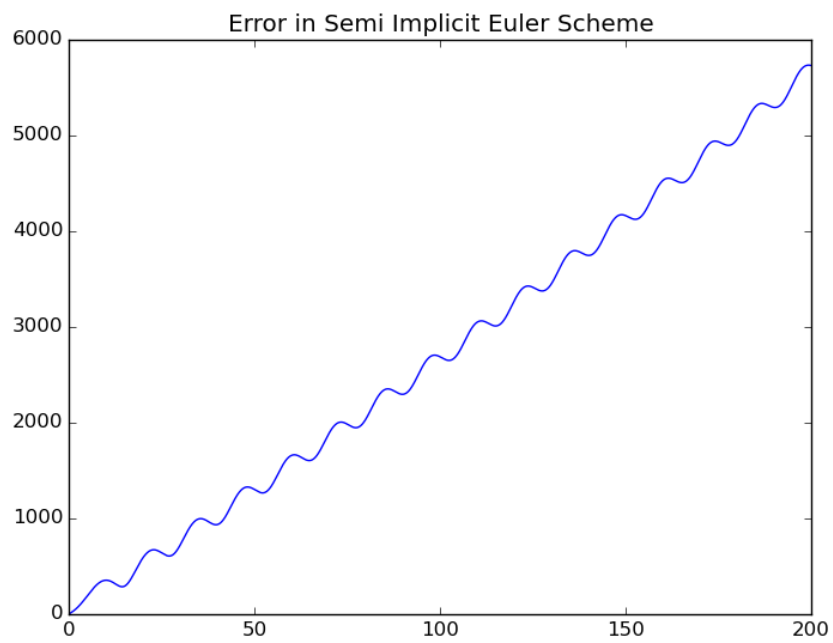
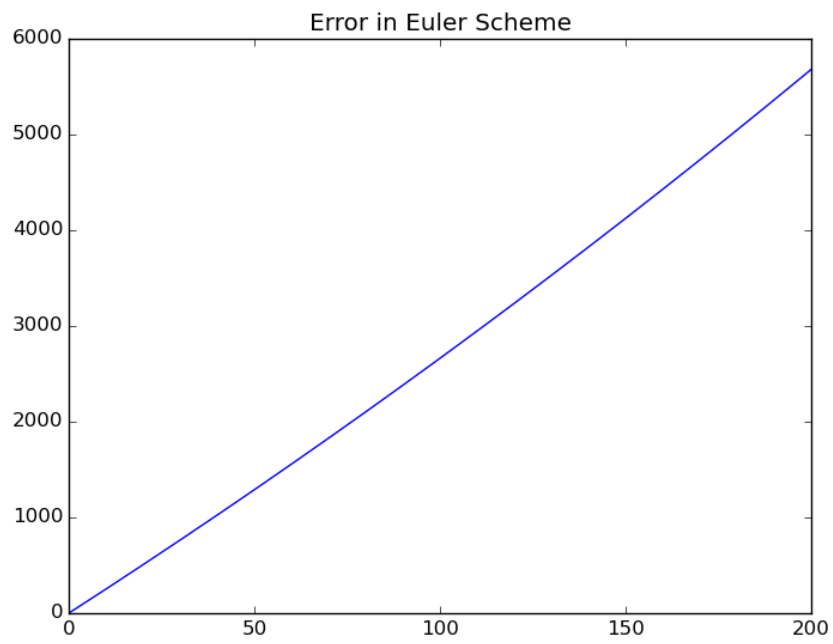


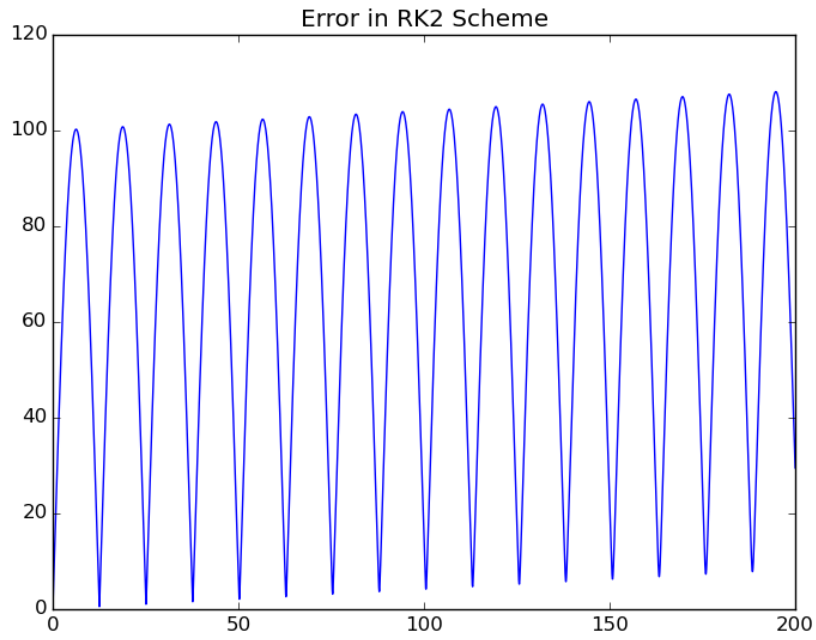


#### 1.4 Error in Particle Position with time using Different Schemes



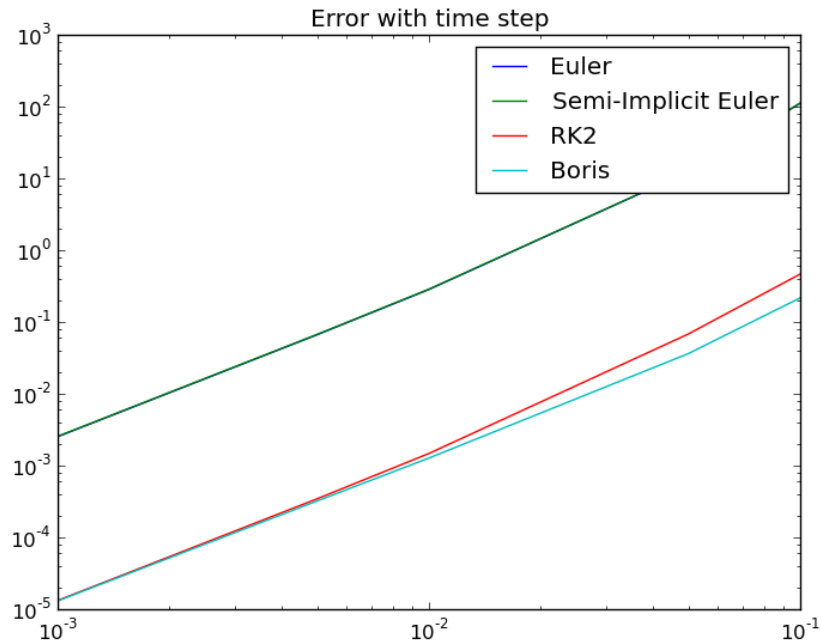






## 2 Question 2

Error in different schemes varying with time step size for the constant magnetic field simulation.

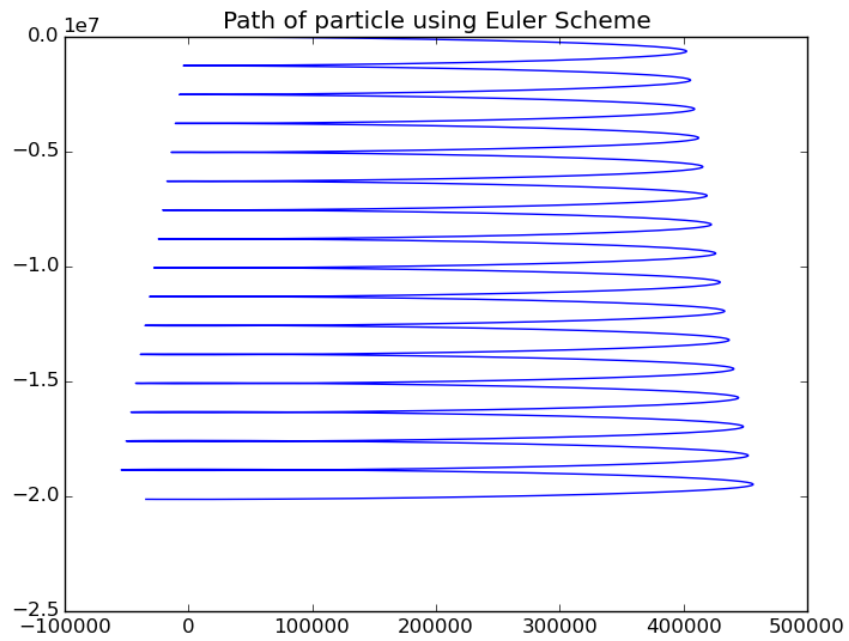
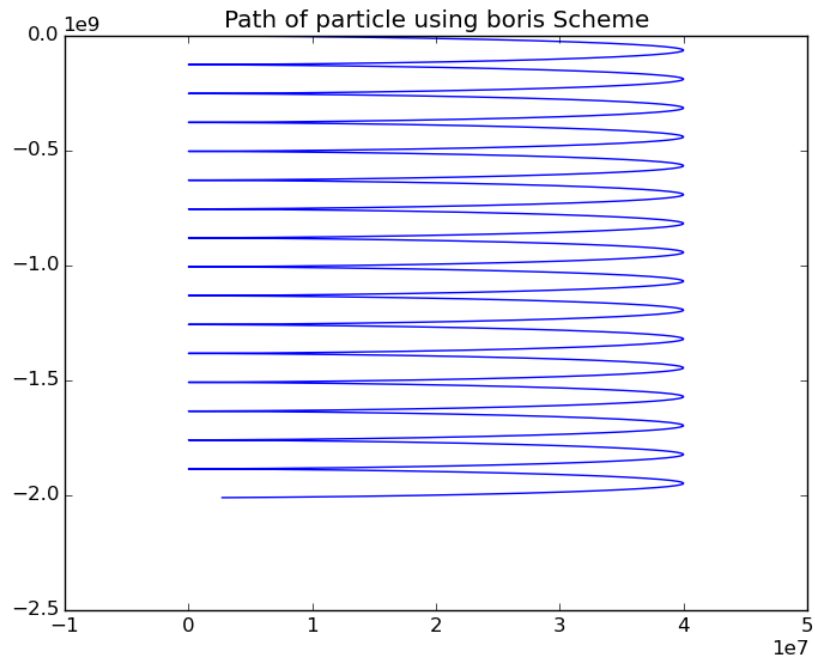


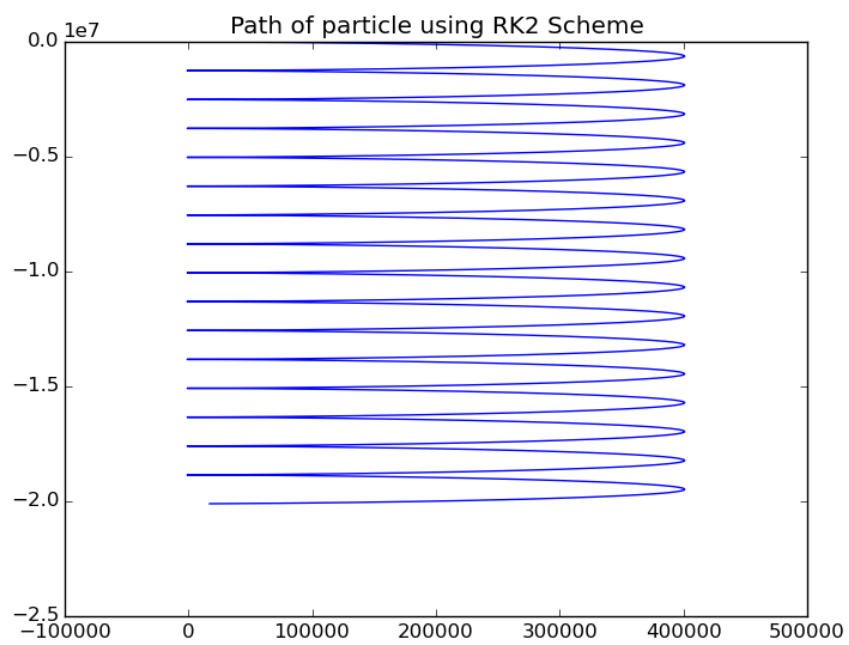
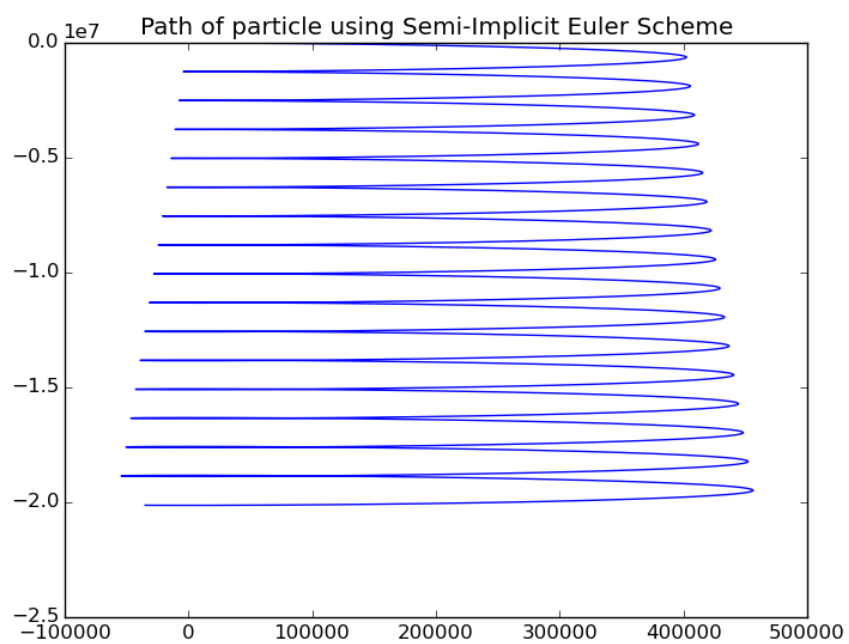
It can be clearly seen that the slope of RK2 is greater than Euler showing the orders of the schemes to be 2 and 1 respectively as the plot is a log log plot.

### 3 Question 3

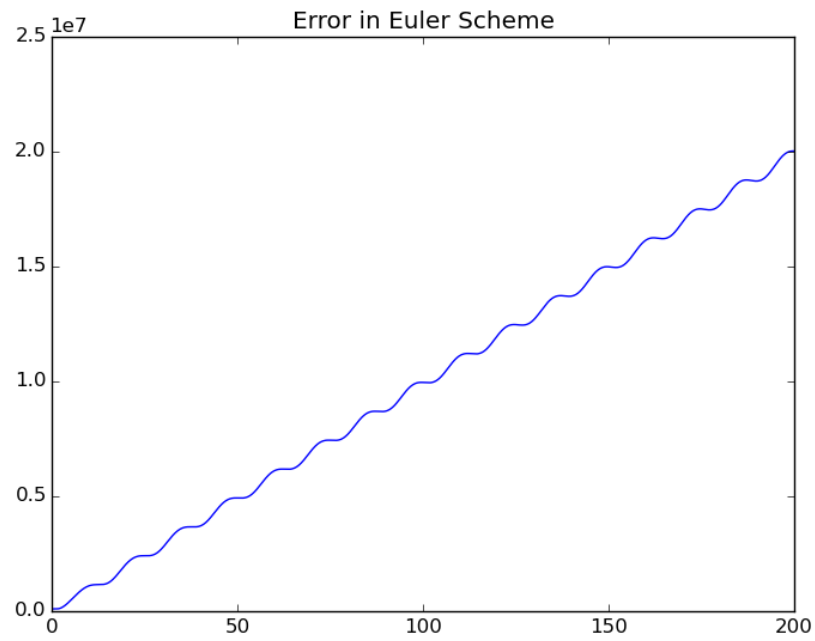
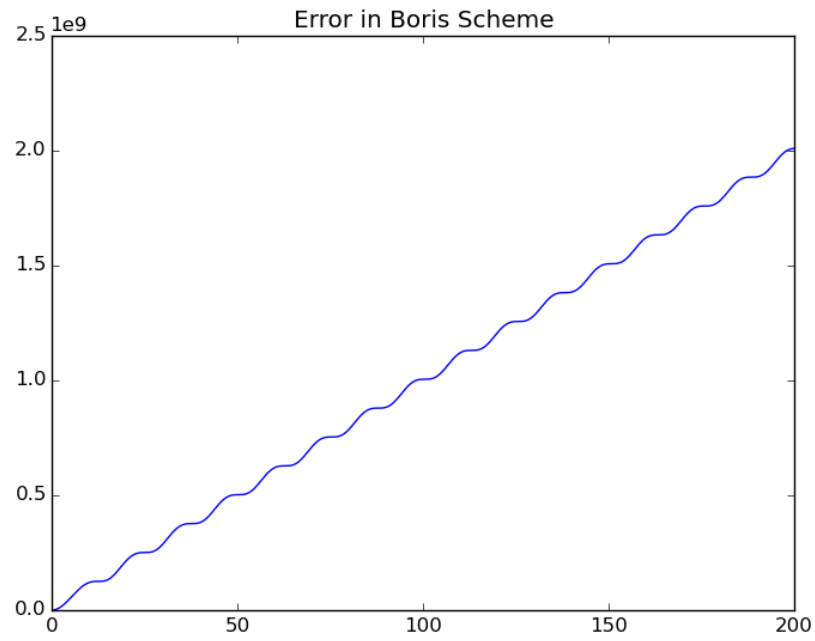
The following plots show the results of motion of a charged particle under the influence of a constant electric field and magnetic field.

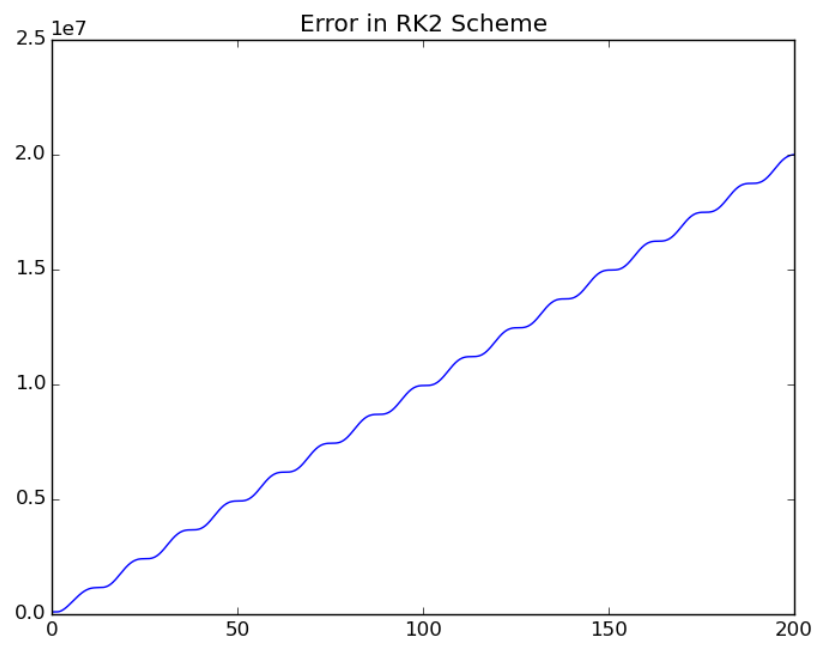
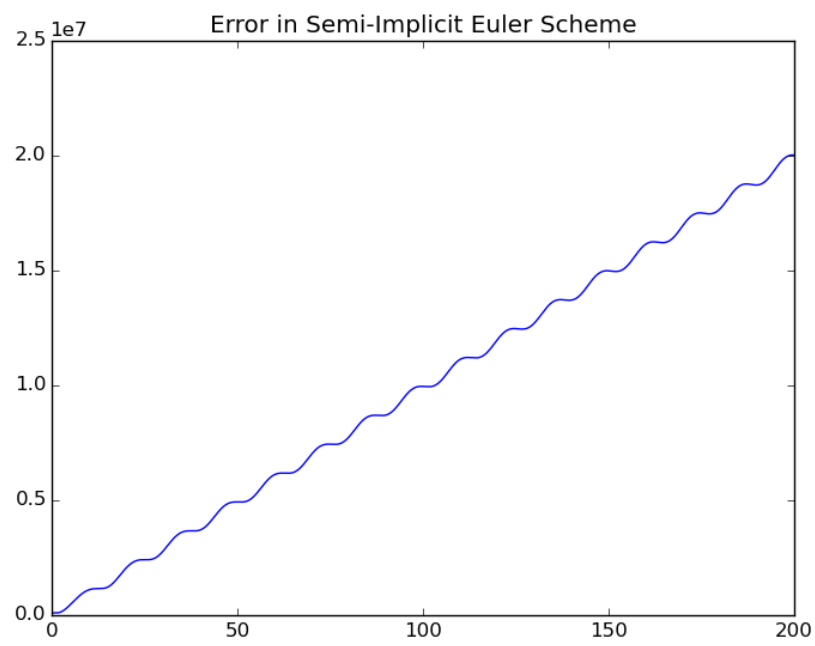
### 3.1 Paths using Different Schemes





### 3.2 Error in Particle Position with time using Different Schemes

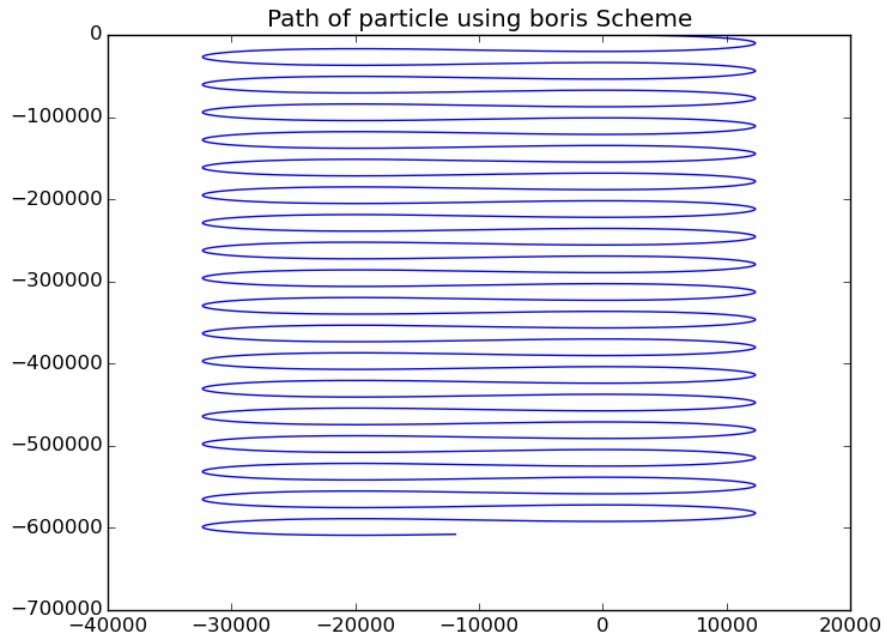




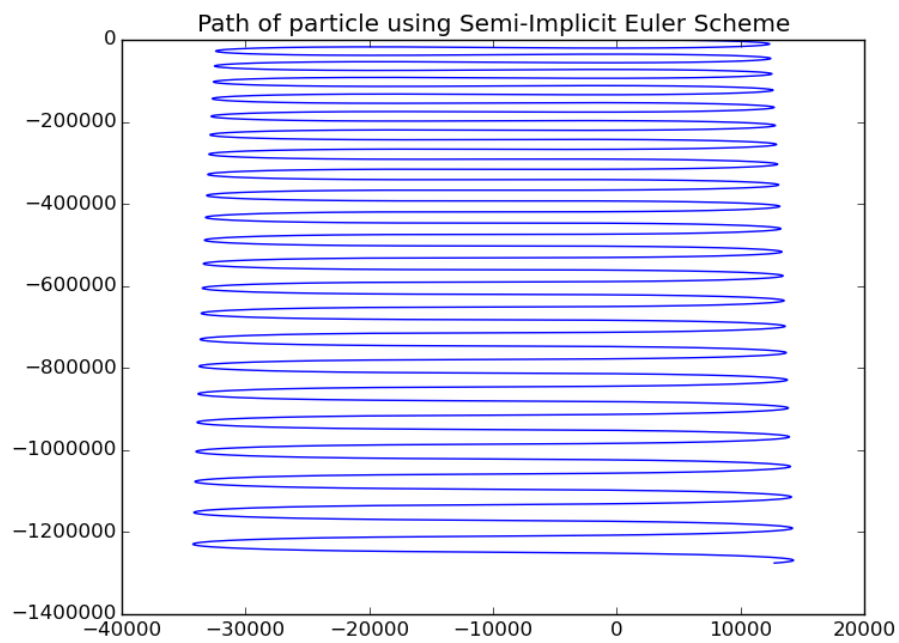
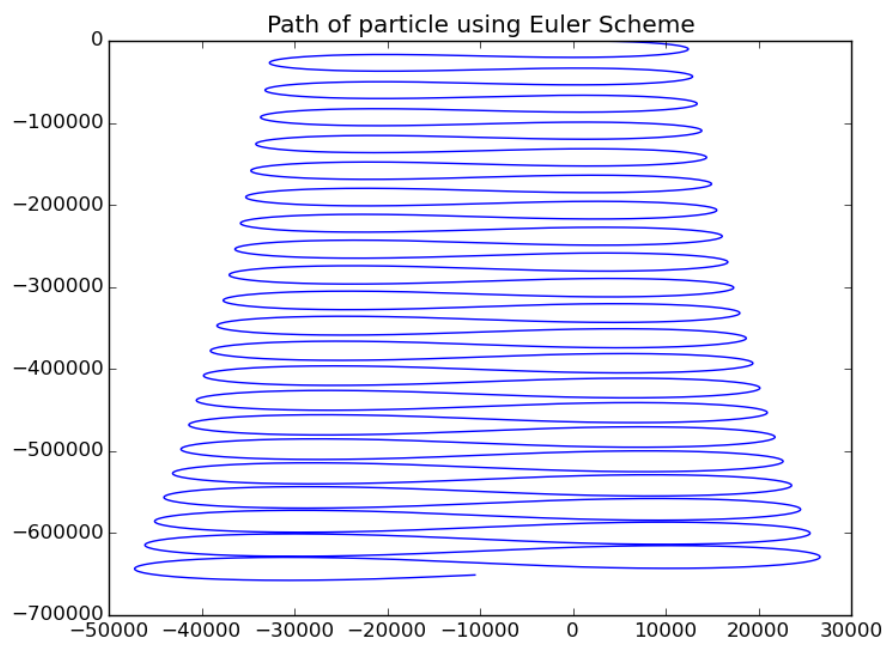
## 4 Question 4

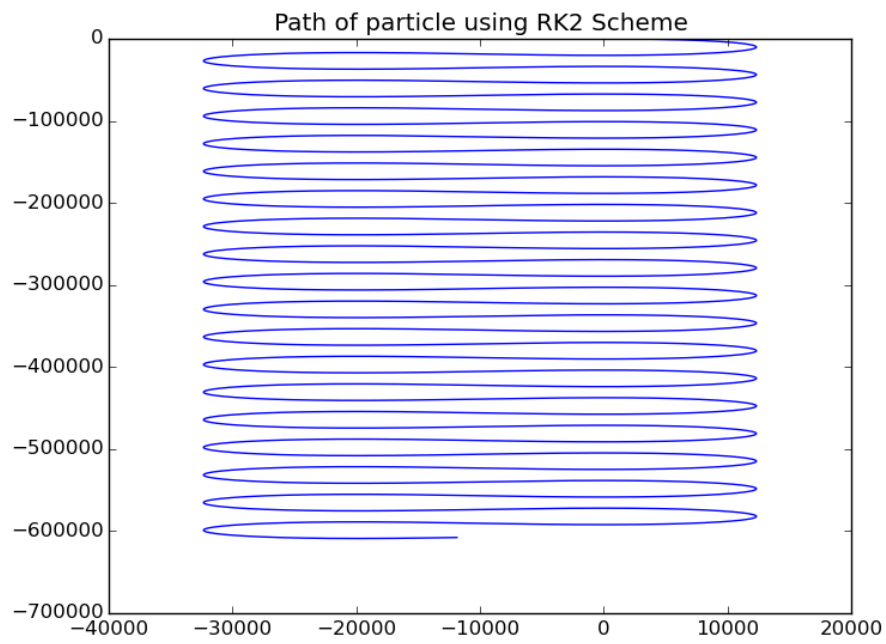
The following plots show the results of motion of a charged particle under the influence of a zero electric field and constant gradient magnetic field whose z-component's gradient is constant along x-axis.

### 4.1 Paths using Different Schemes









#### 4.2 Error in Particle Position with time using Different Schemes

