README

The folder lab06 contains 10 files/folders:

1) lab06.cpp: which contain the code which implement different method which was used to solve symplectic integrators problem .
2) lab06plot.m: which contain the matlab code for plotting the data generated by lab06.cpp
3) makefile: which help to make lab06.cpp file into hw6q2.x file.
4) q11result.txt , q12result.txt, q13result.txt , q14result.txt: which are the intermediate result generated by lab06.cpp they will then be used for matlab plotting
5) Report_part2: contain the electric part of lab06, especially for question 5-(i).
6) README: which is the documentation of the code.
7) Result: which contains the result of the code.

To run the code:

1)Run lab06.cpp:

Linux environment with g++ compiler is needed. Firstly put lab06.cpp and makefile in your workspace. Using terminal run 'make' command. You should see the lab06.x file appear in your workspace. Then you can run lab06.x file by typing './lab06.x' in terminal.

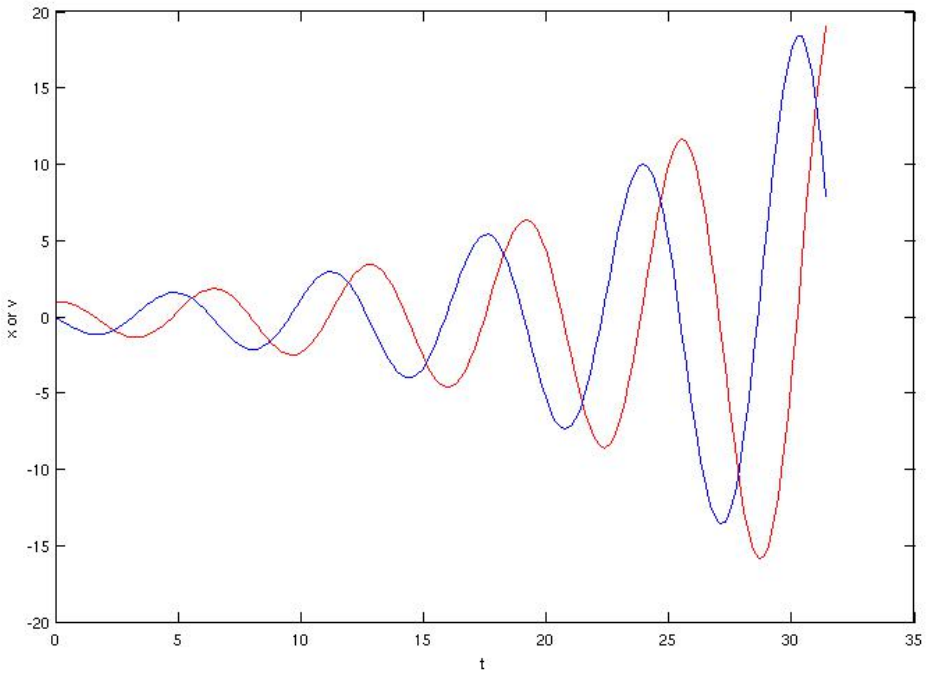
2)Run lab06plot.m:

Use matlab to open the file and click the run button.

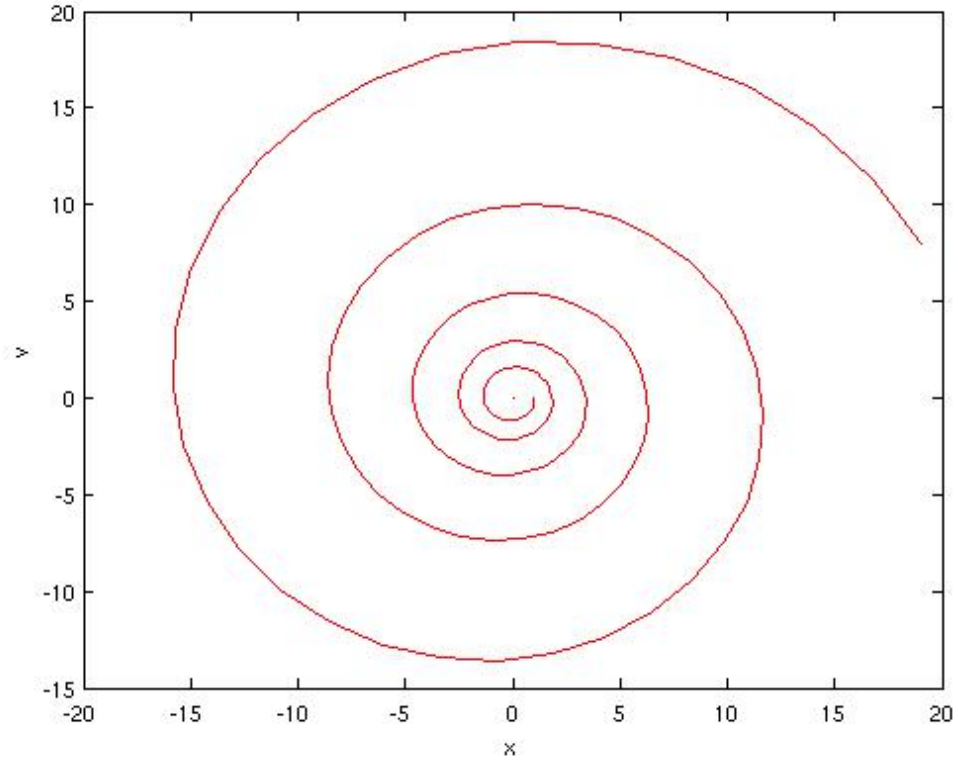
Output of lab06.cpp, lab06plot.m

1.Forward Euler

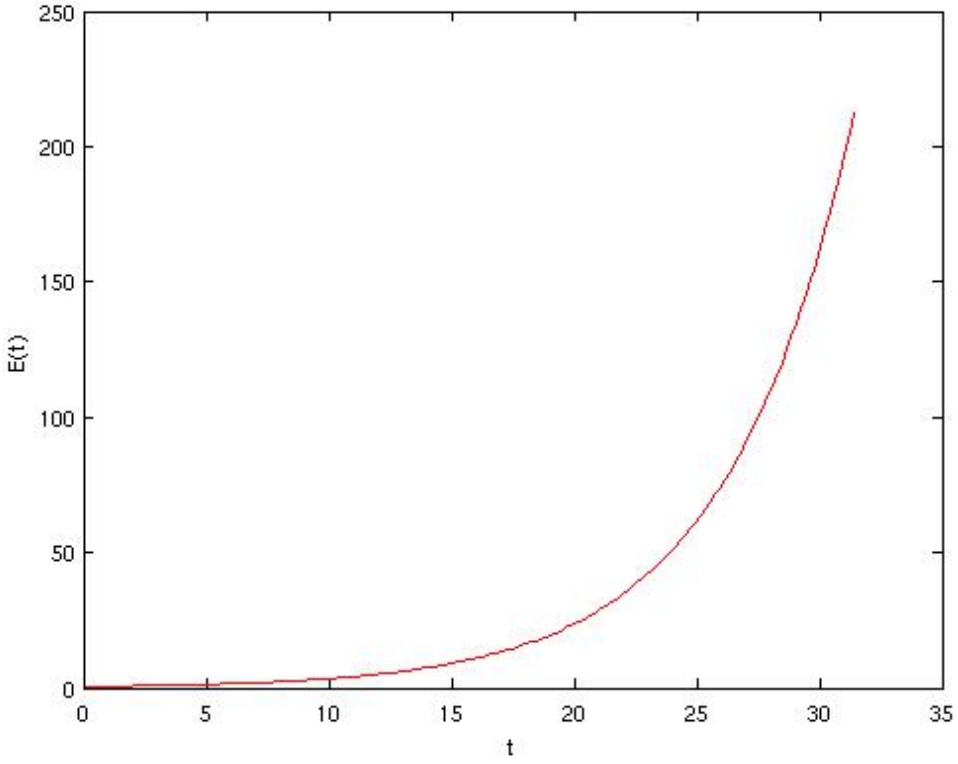
X(t) and v(t):



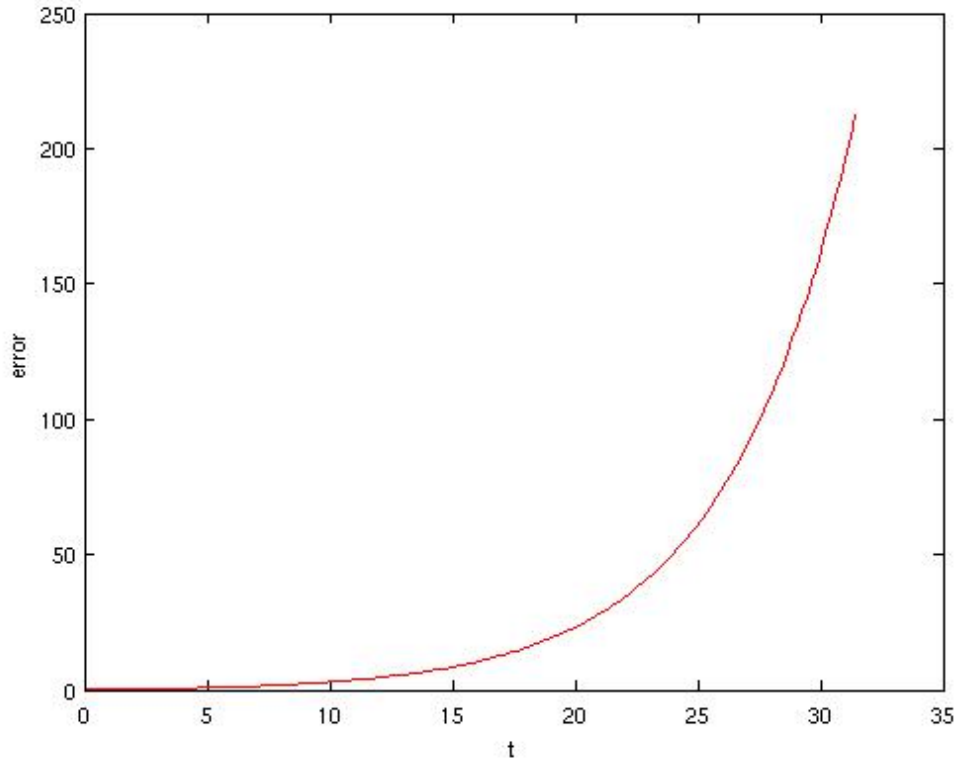
X versus v:



Total energy E(t):

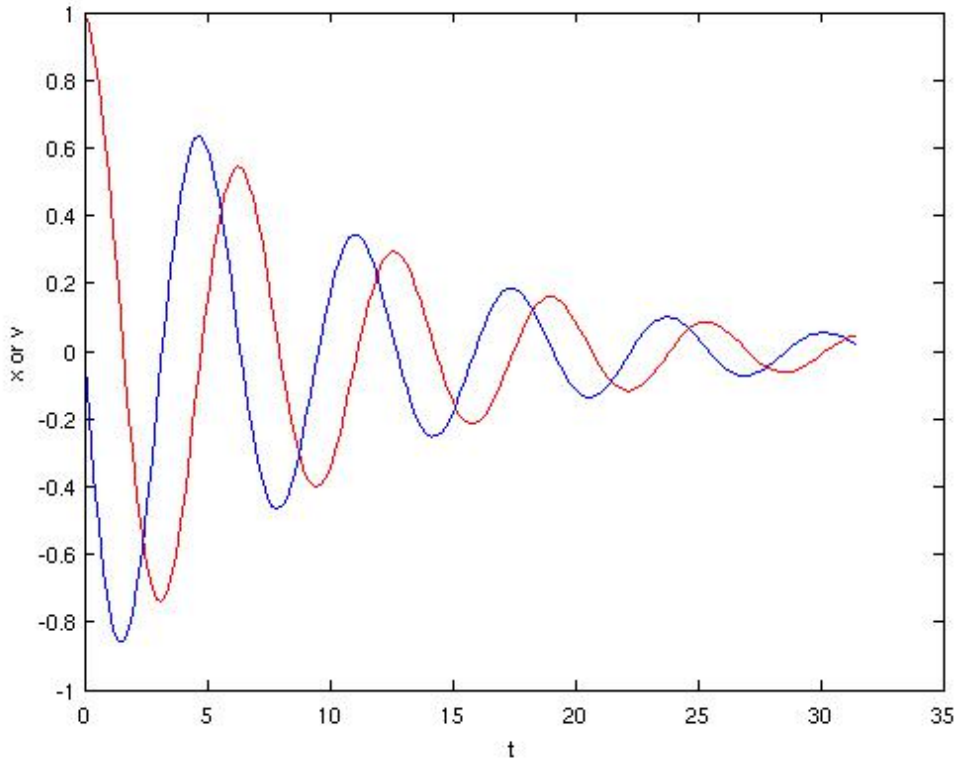


Error compared with exact solution:

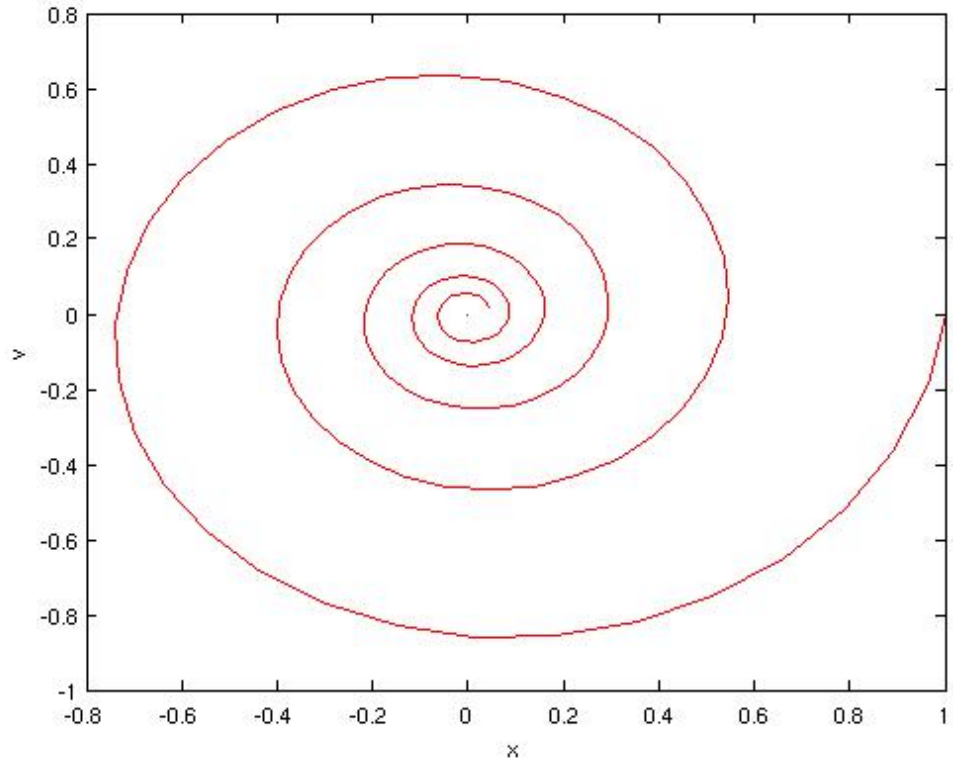


2.Backward Euler

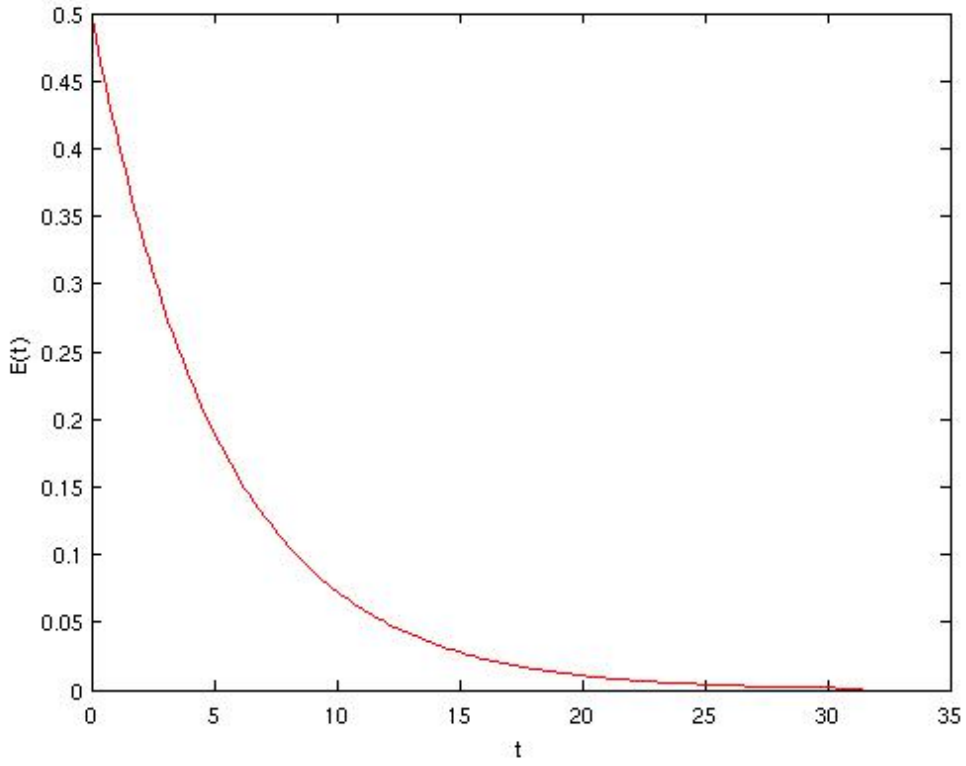
X(t) and v(t):



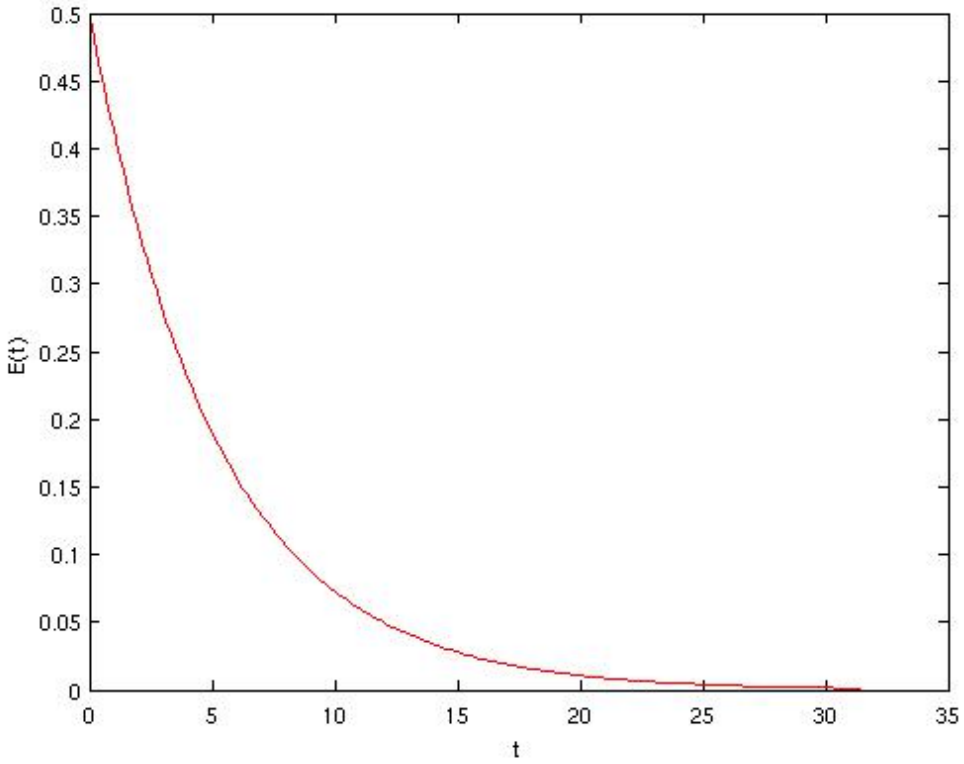
X versus v:



Total energy E(t):

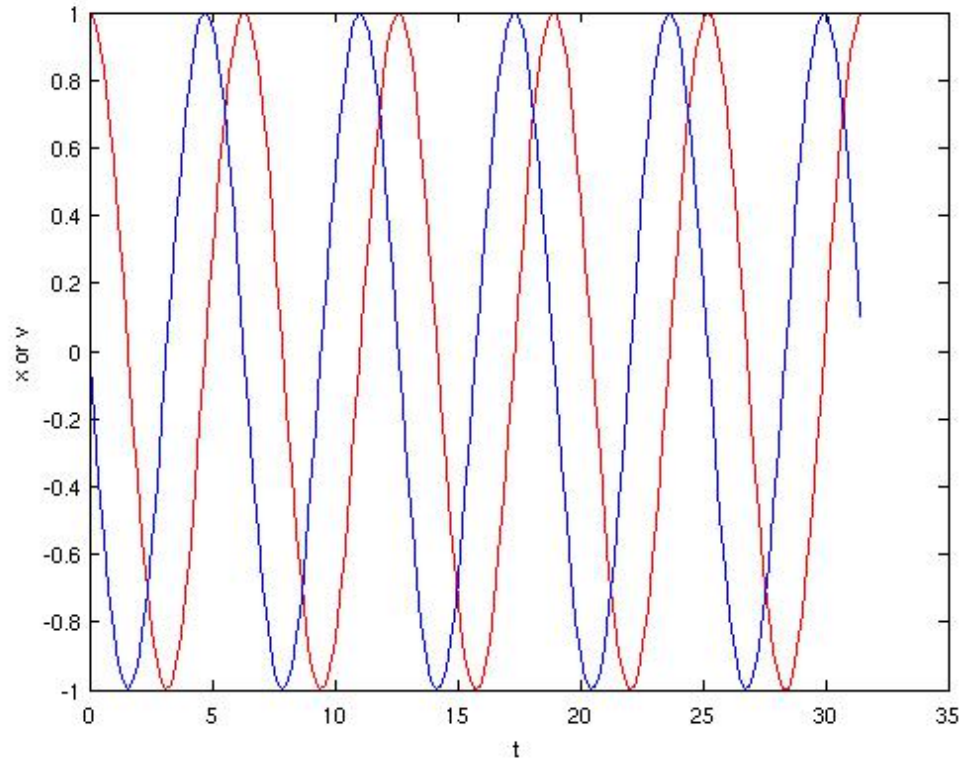


Error compared with exact solution:

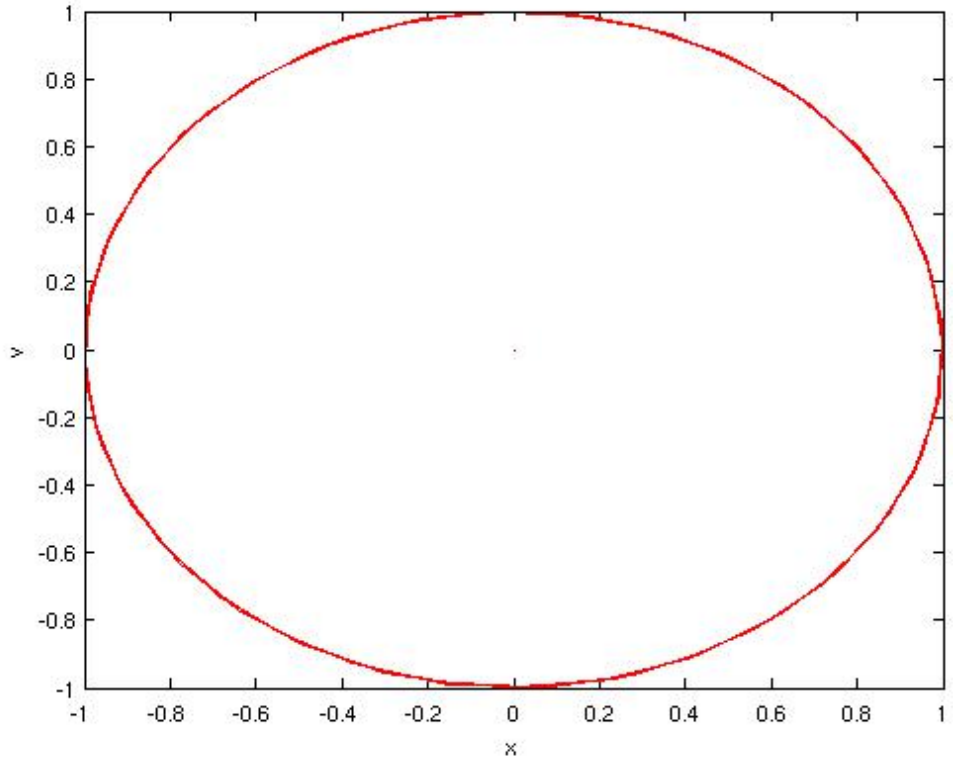


3.Implicit Trapezoidal

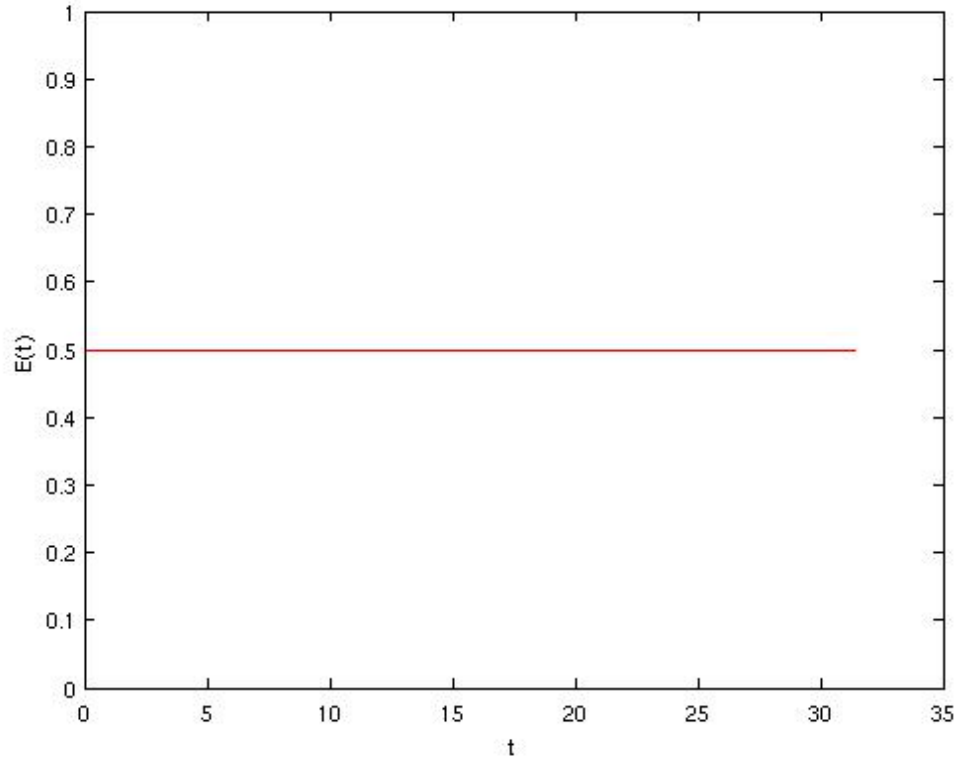
X(t) and v(t):



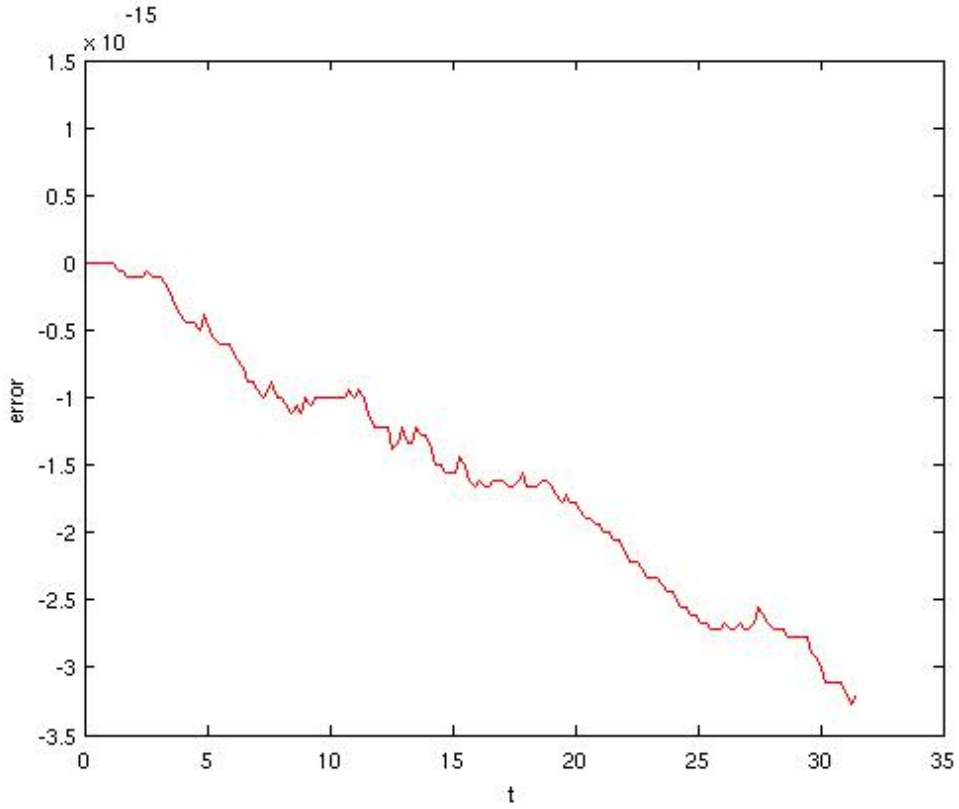
X versus v:



Total energy E(t):

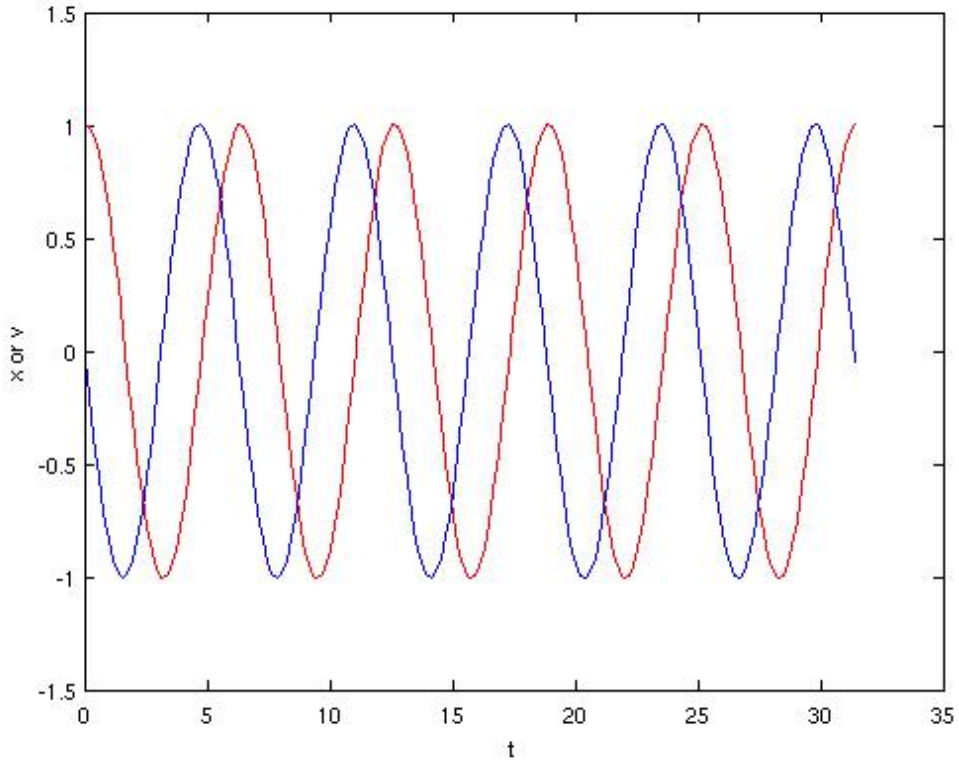


Error compared with exact solution:

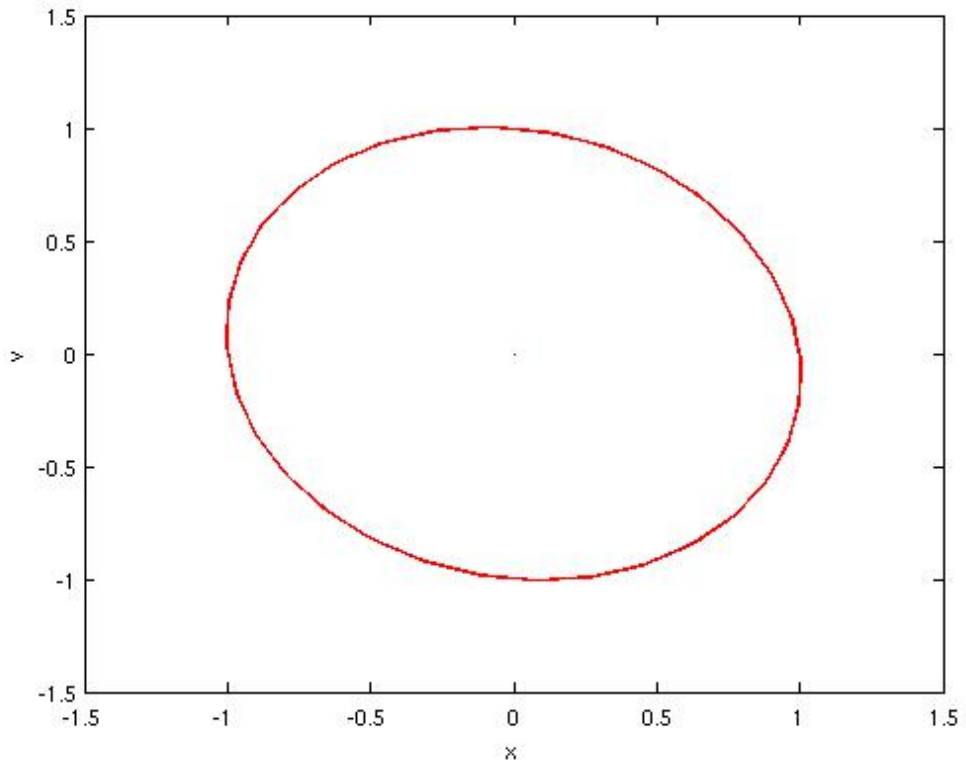


4.Leap-Frog

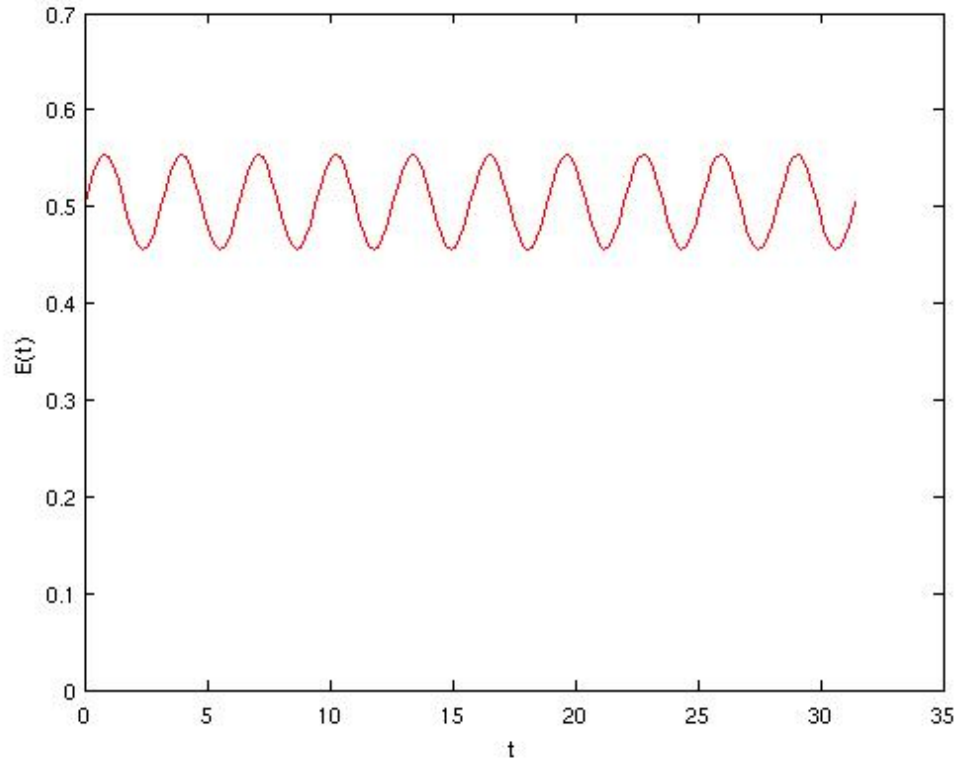
X(t) and v(t):



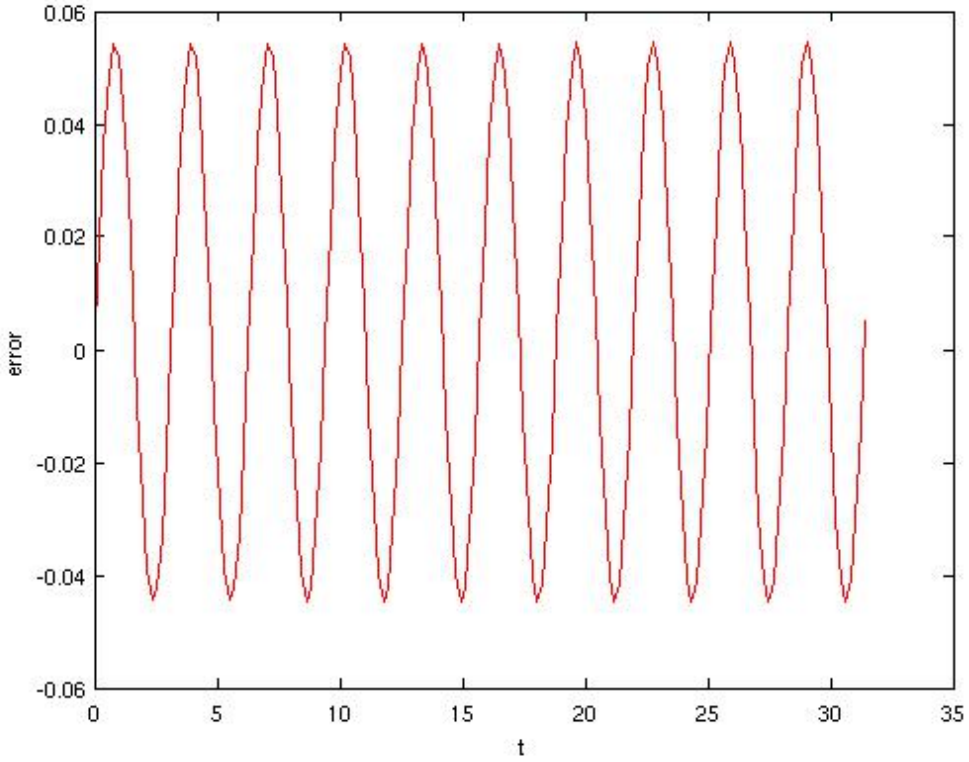
X versus v:



Total energy E(t):



Error compared with exact solution: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-0.02
-0.04
-0.06
error
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