Looks good, check +

Eigen_basis_class

1) After doing HW 2, I realized that I actually still do not understand routines and how to actually connect the files.

   * After finishing Act 7, I understand it better actually *

2) "GslPotential.h"

   ↳ also needs <gsl/gsl_eigen>

3) Solving for the H_{ij}-integrand

Driven Nonlinear Oscillations

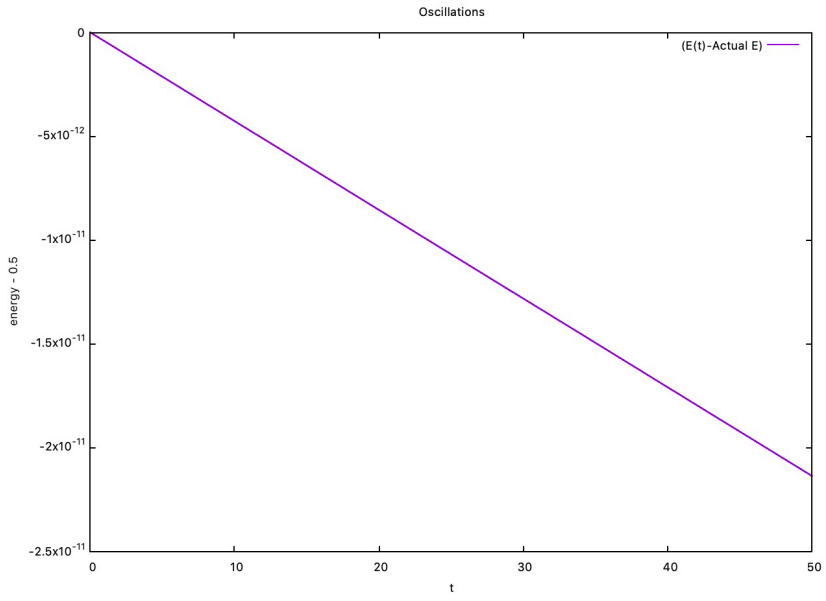
1) plot 1 : position vs time

plot 2 : Velocity vs position

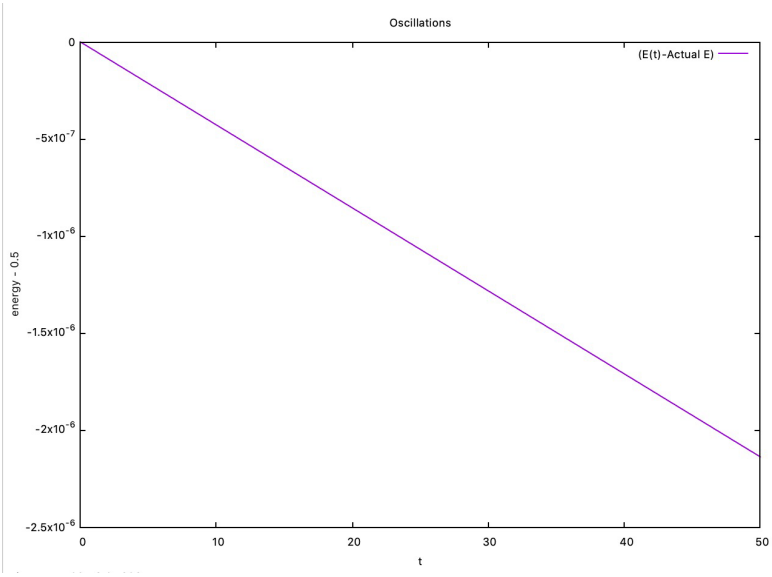
plot 3 : Potential vs position

plot 4 : KE and PE vs time

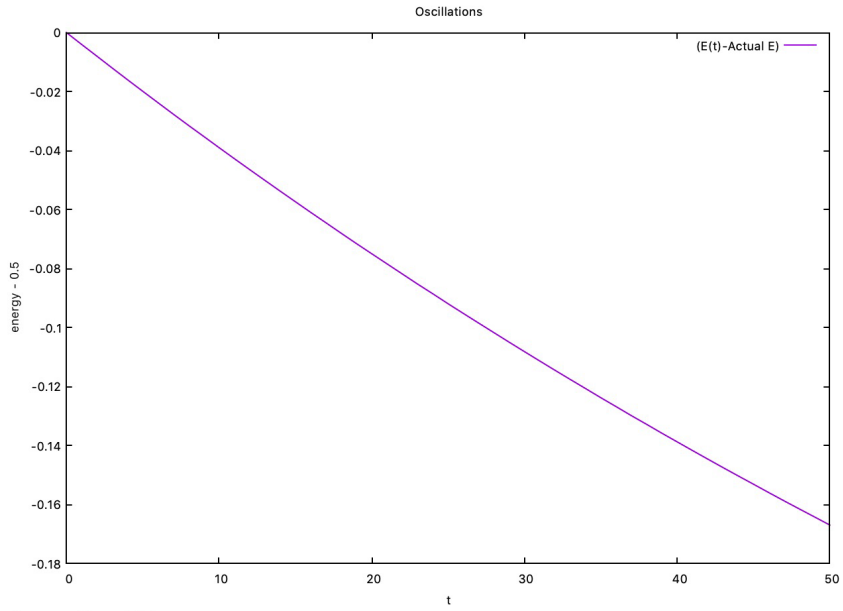
3) h = .001 : use this! smallest error!



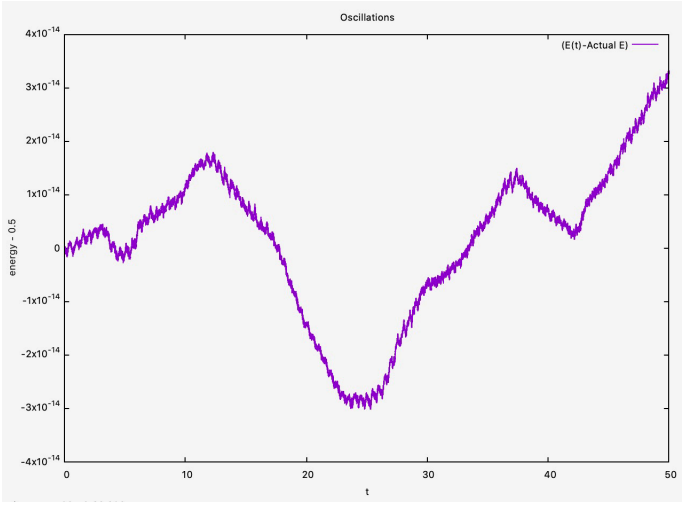
h = .01


Oscillations
(E(t)-Actual E)
0
-5x10^-7
-1x10^-6
-1.5x10^-6
-2x10^-6
-2.5x10^-6
energy - 0.5
0
10
20
30
40
50
t

h = .1

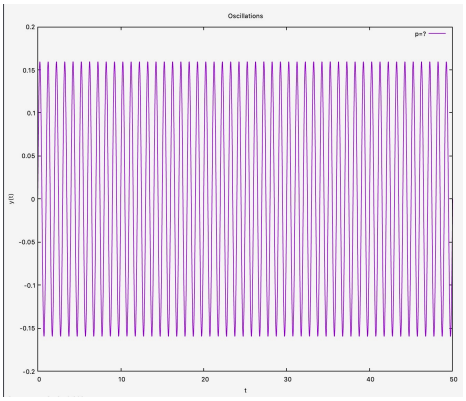

Oscillations
(E(t)-Actual E)
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
-0.16
-0.18
energy - 0.5
0
10
20
30
40
50
t

h=.0001

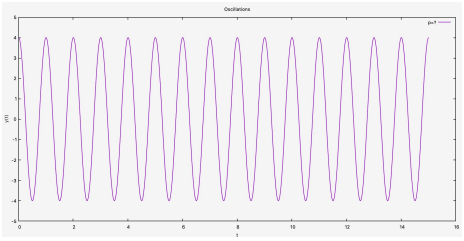


4)

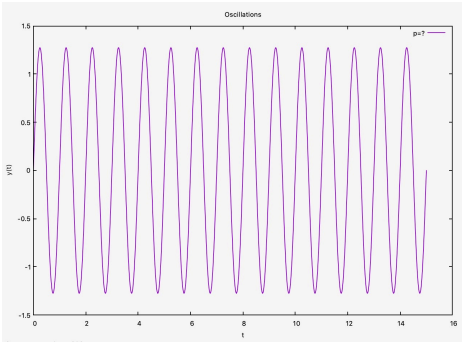
Initial Conditions



x(0)=4



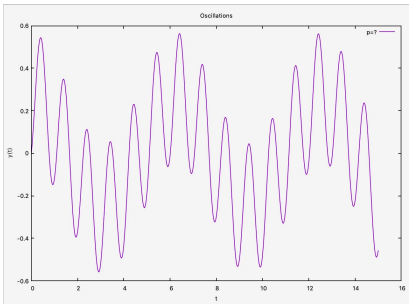
v(0)= 8

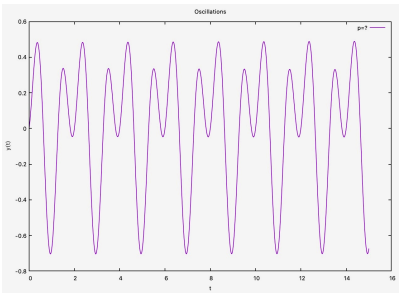


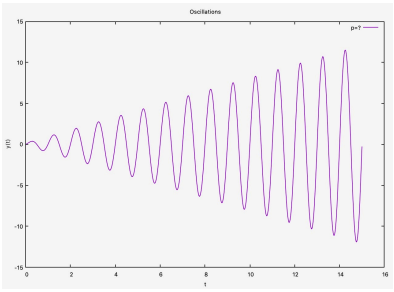
No, a larger amplitude does not mean shorter or longer period. It's possible to have a high amplitude with low speed ⇒ long period. And the same high amplitude with a faster V(0) will have a shorter period.

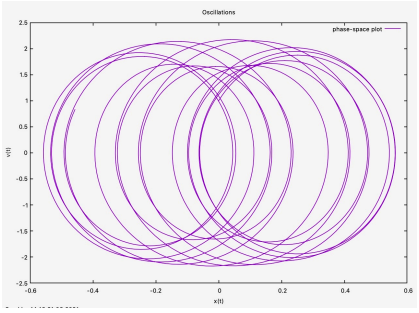
5) P = 2 f_ext = 10

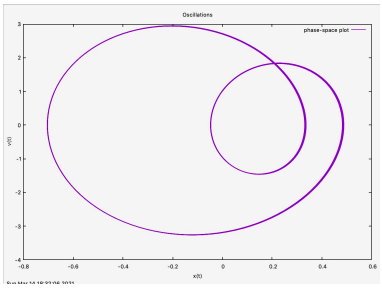
ω_ext = 1 3.14 6.28

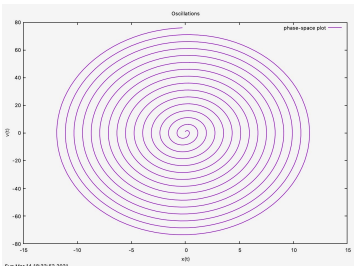






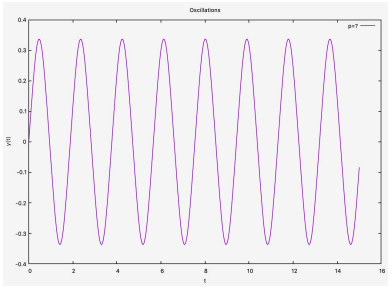


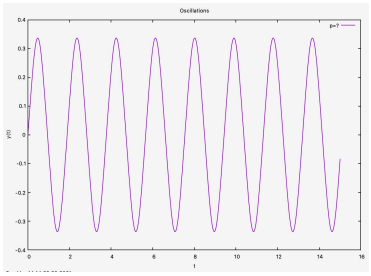


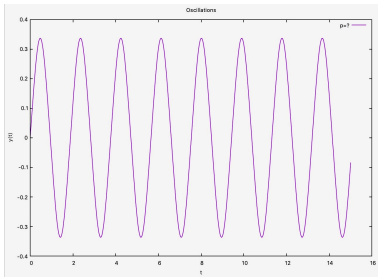


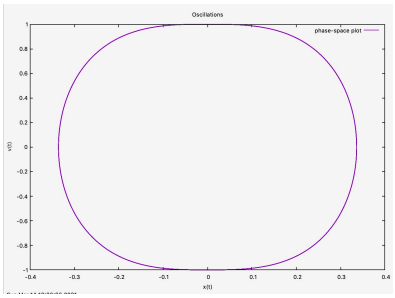
P=3 f_ext=0

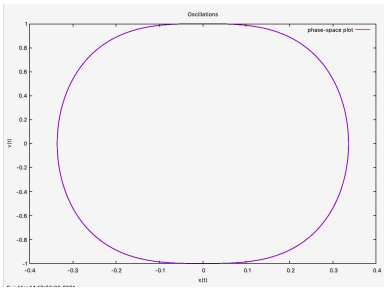
w_ext=1 3.14 6.28

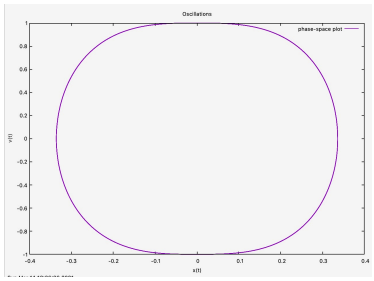






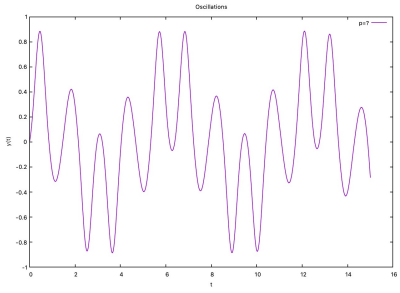


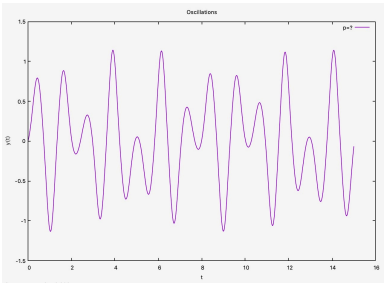


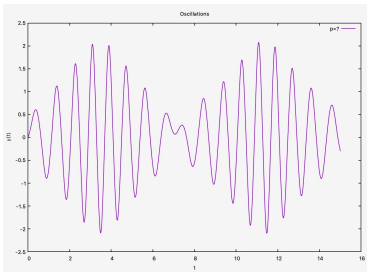


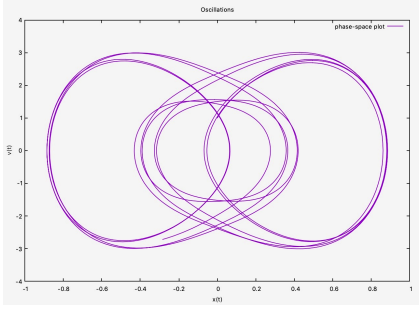
P=3 f_ext=10

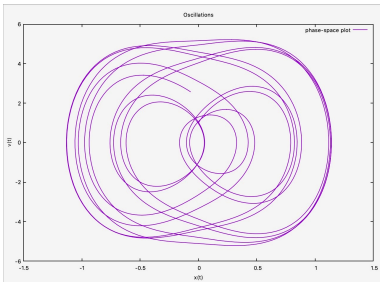
w_ext=1 3.14 6.28

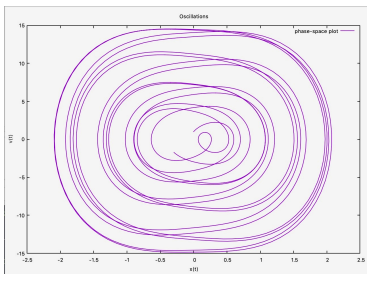












this system is resonant behavior, but not for

P=2 f=10 w=6.28

Adding Damping

1) ✓

2) added
- double b
- double v_0
- double F_ext = (-b·v0) + t·0,

t was causing problems when compiling so I left it

4)

underdamped

$w_0 > \frac{b}{2M}$ $1 > \frac{b}{2}$ $2 > b$

Critically damped

$w_0 = \frac{b}{2M}$ $2 = b$

overdamped

$w_0 < \frac{b}{2M}$ $2 < b$