

[9_1]

inputs

A screenshot of a Jupyter Notebook interface. The top bar shows the URL as localhost and the tab title as HW9 - Jupyter Notebook. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, and a Python 3 option. The code cell contains a Python script for numerical simulation and plotting. The output cell displays command-line input and a long list of numerical values. Below the output is a plot showing two oscillating signals over time.

```
for i in range (1,N):
    tdt*i
    x=x+vd*t
    v=v-k*x*dt/m
    time.append(t)
    xsave.append(x)
    vsave.append(v)

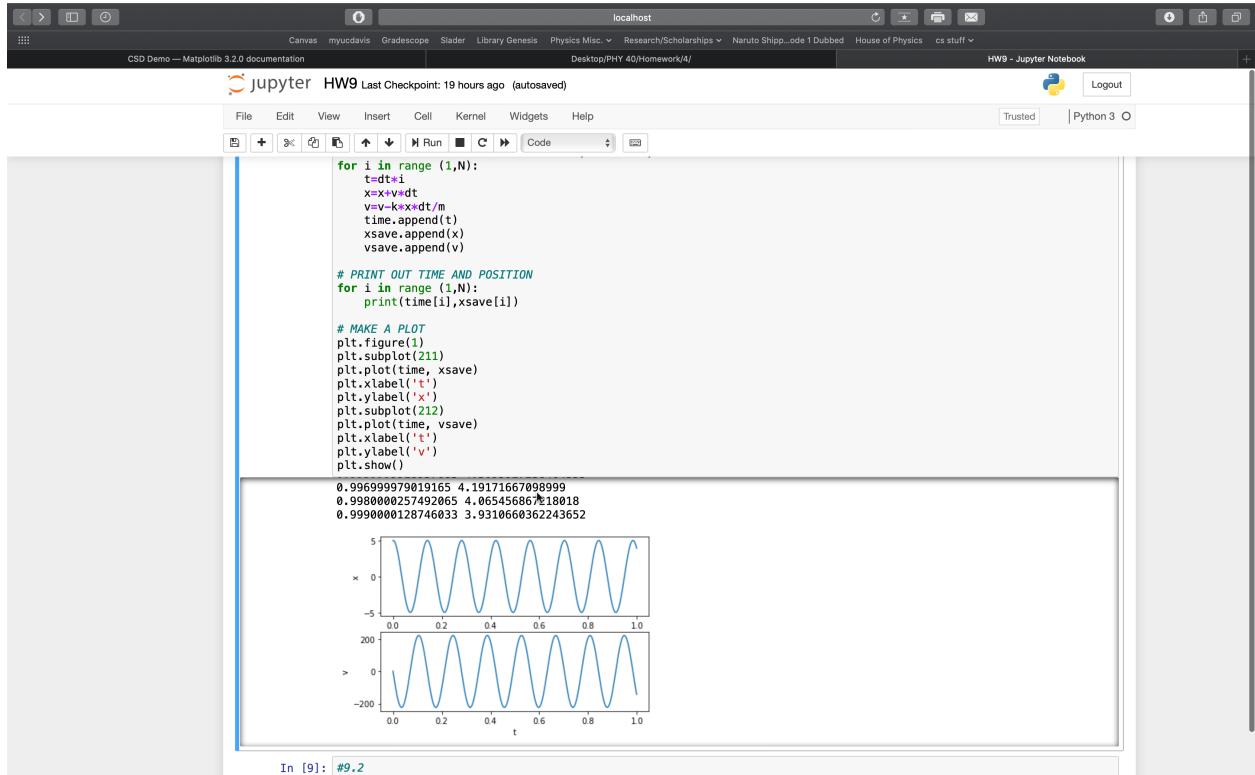
# PRINT OUT TIME AND POSITION
for i in range (1,N):
    print(time[i],xsave[i])

# MAKE A PLOT
plt.figure(1)
plt.subplot(211)
plt.plot(time, xsave)
plt.xlabel('t')
plt.subplot(212)
plt.plot(time, vsave)
plt.xlabel('t')
plt.ylabel('v')
plt.show()

Enter N : 1000
Enter dt : .001
Enter k : 7400
Enter m : 3.7
Enter x0: 5.0
Enter v0: 2.0
0.001000000474974513 5.001999855041504
0.002000000949949026 4.9939961433410645
0.00300000026077032 4.976004123687744
0.00400000089989805 4.94806003570556
0.004999999888241291 4.91021966934284
0.0060000000052154064 4.8625593185424805
0.007000000216065837 4.80513873901367
0.00800000037936563 4.730777673901366
0.0090000005560909 4.651708077673901366
0.0099999999776402582 4.575890314562988
0.010999999940395355 4.480061799621502
0.012000000104308128 4.377052307128906
0.013000000266220901 4.264388561248779
```

In [9]: #9.2

Graphs



[9_2]

Inputs

Jupyter HW9 Last Checkpoint: 19 hours ago (autosaved)

```
File Edit View Insert Cell Kernel Widgets Help
Run C Code
v=v-k*x-dt/m
time.append(t)
xsave.append(x)
vsave.append(v)

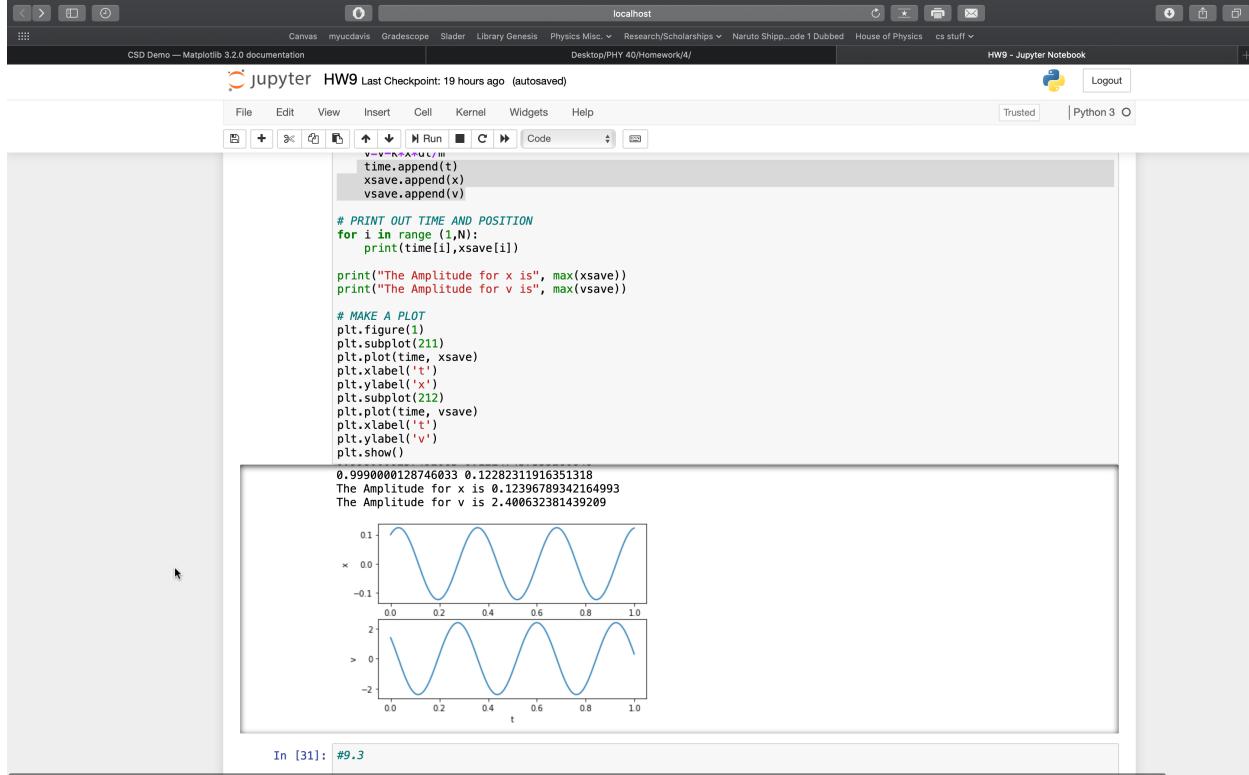
# PRINT OUT TIME AND POSITION
for i in range (1,N):
    print(time[i],xsave[i])

# MAKE A PLOT
plt.figure(1)
plt.subplot(211)
plt.plot(time, xsave)
plt.xlabel('t')
plt.ylabel('x')
plt.subplot(212)
plt.plot(time, vsave)
plt.xlabel('t')
plt.ylabel('v')
plt.show()

Enter N : 1000
Enter dt: .001
Enter k : 75
Enter m : 0.2
Enter x0: 0.1
Enter v0: 1.4
0.0010000000474974513 0.10140000283718109
0.0020000000949949026 0.10276197642087936
0.003000000026077032 0.10408541560173035
0.0040000000189989805 0.1053698211983495
0.004999999886241291 0.10661471635103226
0.0060000000052154064 0.10781963169574738
0.0070000000216066837 0.10898410528896239
0.008000000037997961 0.11010771989822388
0.008999999612569809 0.11119004338979721
0.009999999776482582 0.11223066598176956
0.010999999940395355 0.11322920769453049
0.012000000104308128 0.1141852810978895
0.013000000268220901 0.11509854346513748
0.01400000037223207 0.11599999999999999
```

In [31]: #9.3

Graphs



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Jupyter HW9 Last Checkpoint: 19 hours ago (autosaved)

```
File Edit View Insert Cell Kernel Widgets Help
[+]
Trusted Python 3
```

```
plt.figure(1)
plt.subplot(221)
plt.plot(time, xsave)
plt.xlabel('t')
plt.ylabel('x')
plt.subplot(223)
plt.plot(time, ysave)
plt.xlabel('t')
plt.ylabel('y')
plt.subplot(222)
plt.plot(time, vxsave)
plt.xlabel('t')
plt.ylabel('vx')
plt.subplot(224)
plt.plot(time, vysave)
plt.xlabel('t')
plt.ylabel('vy')
plt.show()

Enter N : 5250
Enter dt: .001
Enter x0: 0
Enter y0: 30
Enter vx0: 15
Enter vy0: 20
5.249000072479248
```

```
In [43]: #9.4
```

Continued Below

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Inputs

Jupyter HW9 Last Checkpoint: 19 hours ago (autosaved)

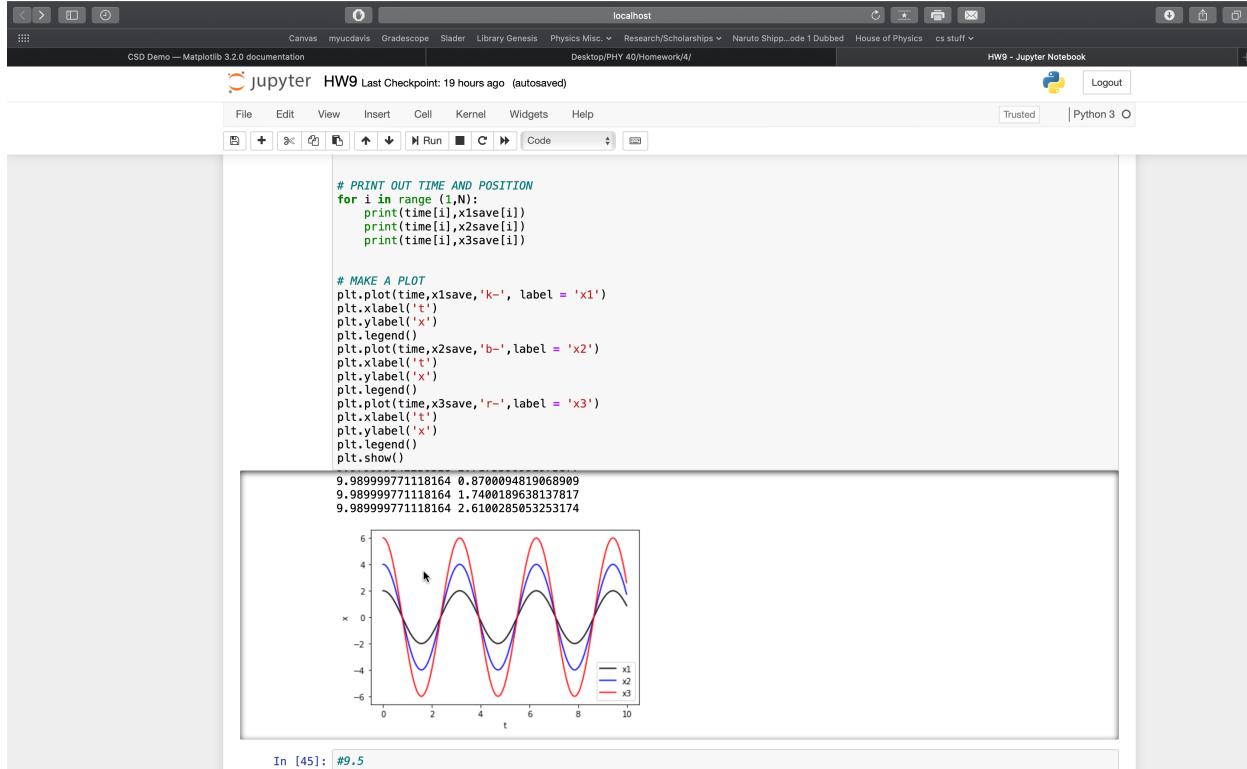
```
# PRINT OUT TIME AND POSITION
for i in range (1,N):
    print(time[i],x1save[i])
    print(time[i],x2save[i])
    print(time[i],x3save[i])

# MAKE A PLOT
plt.plot(time,x1save,'k-', label = 'x1')
plt.xlabel('t')
plt.ylabel('x')
plt.legend()
plt.plot(time,x2save,'b-',label = 'x2')
plt.xlabel('t')
plt.ylabel('x')
plt.legend()
plt.plot(time,x3save,'r-',label = 'x3')
plt.xlabel('t')
plt.ylabel('x')
plt.legend()
plt.show()

Enter N : 1000
Enter dt: .01
Enter k : 3.0
Enter m : 0.75
Enter x10: 2.0
Enter x20: 4.0
Enter x30: 6.0
Enter v0: 0.0
0.009999999776482582 2.0
0.009999999776482582 4.0
0.009999999776482582 6.0
0.019999999552965164 1.9991999864578247
0.019999999552965164 3.9983999729156494
0.019999999552965164 5.997600078582764
0.029999999329447746 1.9976003170013428
0.029999999329447746 3.9952006340026855
0.029999999329447746 5.992801189422607
0.0399999991059303 1.995201587677802
0.0399999991059303 3.990403175354084
0.0399999991059303 5.987801189422607
```

In [45]: #9.5

Graphs



[9_6]

V_y = 1/2V

```
dt = 31536.0
for i in range (1,N):
    x=x+vx*dt
    y=y-vy*dt
    R = (x**2. + y**2.)**(.5)
    ax = -g*ms*x/R**3
    ay = -g*ms*y/R**3
    vx=vx+ax*dt
    vy=vy+ay*dt
    t = t + dt
    xsave.append(x)
    ysave.append(y)

# PRINT OUT TIME AND POSITION
# for i in range (1,N):
#     print(xsave[i],ysave[i])

# MAKE A PLOT
plt.plot(xsave,ysave)
plt.xlabel('x')
plt.ylabel('y')
plt.show()
```

Enter vy: 15000

In []:

V_y = V

```
y = 0.0
vx = 9.0
vy = float(V)
N = 1000
t=0.0
dt = 31536.0

for i in range (1,N):
    x=x+vx*dt
    y=y-vy*dt
    R = (x**2. + y**2.)**(.5)
    ax = -g*ms*x/R**3
    ay = -g*ms*y/R**3
    vx=vx+ax*dt
    vy=vy+ay*dt
    t = t + dt
    xsave.append(x)
    ysave.append(y)

# PRINT OUT TIME AND POSITION
# for i in range (1,N):
#     print(xsave[i],ysave[i])

# MAKE A PLOT
plt.plot(xsave,ysave)
plt.xlabel('x')
plt.ylabel('y')
plt.show()
```

Enter vy: 30000

$$V_Y = 2V$$

localhost

Canvas myicdavis Gradescope Slader Library Genesis Physics Misc. Research/Scholarships Naruto Shipp...ode 1 Dubbed House of Physics cs stuff

Desktop/PHY 40/Homework/4 HW9 - Jupyter Notebook

```
N = 1000
t=0.0
dt = 31536.0

for i in range (1,N):
    x=x+vx*dt
    y=y+vy*dt
    R = (x**2. + y**2.)**(1/2.)
    ax = -g*ms*x/R**3
    ay = -g*ms*y/R**3
    vx=vx+ax*dt
    vy=vy+ay*dt
    t = t + dt
    xsave.append(x)
    ysave.append(y)

# PRINT OUT TIME AND POSITION
# for i in range (1,N):
#     print(xsave[i],ysave[i])

# MAKE A PLOT
plt.plot(xsave,ysave)
plt.xlabel('x')
plt.ylabel('y')
plt.show()
```

Enter vy: 60000

The plot shows a single blue curve representing the trajectory of an object. The x-axis is labeled 'x' and ranges from -3 to 1. The y-axis is labeled 'y' and ranges from 0.0 to 1.4. The curve starts at a high y-value near x=-3 and decreases as it moves towards the right. It has a slight upward bend or inflection point around x=-1.5 before continuing its downward path towards the x-axis at x=1.