```
 1 #Problem 2-12
 2
 3 import numpy as np
 4 import matplotlib.pyplot as plt
 5 from math import pi,sin
 6
 7 # def TraceSolverB(h):
 8 #     theta_vec=[pi/2]
 9 #     phi_vec=[0]
10 #     t=0
11 #
12 #     current_theta=pi/2
13 #     current_phi=0
14 #
15 #     while t<=30:
16 #         theta_vec.append(current_phi*h+current_theta)
17 #         phi_vec.append(current_phi-h*sin(current_theta))
18 #         current_theta=theta_vec[-1]
19 #         current_phi=phi_vec[-1]
20 #         t+=h
21 #     return(theta_vec,phi_vec)
22 #
23 # plt.style.use('ggplot')
24 # fig = plt.figure()
25 # ax1 = fig.add_subplot(111)
26 #
27 # # part (b)
28 #
29 # theta=TraceSolverB(0.1)[0]
30 # t=np.array(range(len(theta)))*0.1
31 # ax1.plot(t, theta, label='h = 0.1')
32 # ax1.set_xlabel("t")
33 # ax1.set_ylabel(r'$\theta$')
34 # plt.title('Problem 2-12 Euler Method')
35 # plt.legend()
36 # plt.show()
37
38 # part (c)
39
40 # def TraceSolverC(h):
41 #     theta_vec=[pi/2,pi/2]
42 #     t=0
43 #
44 #     while t<=30:
45 #         theta_vec.append(((-1)*sin(theta_vec[-1])*(h**2)+
   2*theta_vec[-1]-theta_vec[-2]))
46 #         t+=h
47 #
48 #     return theta_vec
49 #
```

```
50 # plt.style.use('ggplot')
51 # fig = plt.figure()
52 # ax1 = fig.add_subplot(111)
53 # theta=TraceSolverC(0.1)
54 # t=np.array(range(len(theta)))*0.1
55 # ax1.plot(t, theta, label='h = 0.1')
56 # ax1.set_xlabel("t")
57 # ax1.set_ylabel(r'$\theta$')
58 # plt.title('Problem 2-12 Verlet Method')
59 # plt.legend()
60 # plt.show()
```