Differential equations: the pendulum

Solve ordinary differential equation for a simple harmonic oscillating system using 3 methods.   
Equation of a simple pendulum:   
Methods for solving equation:

-Euler

- Midpoint

-Verlet  
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Plot the pendulum trajectory *θ(t)* for 3 time steps *δ = 0.1*, *0.01*, and *0.001*. Zoom in on the curve   
at one of the coarse points (say, *t = 1*) and visually compare the values from the three time steps. Initial conditions: *θ0 = 2π/3*, *θ = 0*, *g = 9.8 m/s2* and *L = 1 m*. Additionaly plot equation solition in phase space.  
All graphs should have a title, axis description and be saved to a file.  
Example solution graphs are shown in Figure 1 and Figure 2.





