PHYS 5120: Homework 1

Author: MIAO Wangqian, Student ID: 20617902

1. The Linear and nonlinear pendulums

1.1

The equation of motion is in the format of:

$$\frac{\mathrm{d}^2}{\mathrm{d}t^2} + \frac{g}{\ell}\theta = 0$$

.

And the solution of the differential equation is:

$$\theta = A\cos(\sqrt{\frac{g}{\ell}}t + \delta)$$

.

There are two parameters A, δ in the solution because we do not know the initial condition $\theta(t=0), \dot{\theta}(t=0)$.

The swing period is:

$$T = 2\pi\sqrt{\frac{\ell}{g}}$$

.

1.2