

Physics 5300, Theoretical Mechanics Spring 2015

Quiz 2

Given: Friday Jan 23

Problem 1 Write down the potential energy $U(\phi)$ of a simple pendulum (mass m , length l) in terms of the angle ϕ between the pendulum and the vertical. (Choose the zero of U at the bottom.) Show that for small angles, U has the Hooke law form $const + \frac{1}{2}kx^2$. What is k ?

Problem 2 A mass on the end of a spring is oscillating with an angular frequency ω . At $t = 0$, its position is $x_0 > 0$ and I give it a kick so that it moves back towards the origin and executes simple harmonic motion with amplitude $2x_0$. Find its position as a function of time in the form

$$x(t) = A \cos(\omega t - \delta) \tag{1}$$