

Math 207C
Homework 6
Due Friday, May 20th

1. The dimensionless equation of motion of a frictionless pendulum is

$$\frac{d^2\theta}{dt^2} + \sin\theta = 0.$$

In the limit of small amplitude, the period is 2π to leading order. Compute the next term in the expansion of the period for small amplitude.

2. Find the first term approximation valid for long time to the initial value problem

$$\begin{aligned}\ddot{u} + \epsilon(u^2 - 1)\dot{u} + u &= 0 \\ u(0) &= 0, \quad \dot{u}(0) = 1.\end{aligned}$$