(1) For the simple frictional Pendulum sketch the phase plane for
   (a) $\gamma^2 - 4k = 0$ and
   (b) $\gamma^2 - 4k > 0$.

(2) Suppose we are far enough from Earth that $g \ll 1$, so $\epsilon = g/L \ll 1$. Then our Pendulum equation becomes

$$\ddot{\theta} + \gamma\dot{\theta} + \epsilon \sin\theta = 0 \tag{1}$$

and suppose it receives a tiny push $\dot{\theta}(0) = \epsilon$ at position $\theta(0) = 0$.

Do we need Poincaré – Lindsted? Try to solve up to the first nonlinear order; i.e., the first order of ϵ where the ODE is nonlinear and produces a nonzero result.