PHYS-3202 Homework 11 NOT DUE

This homework is for your use in studying for the final exam. I will post solutions on the course page later.

1. **Steady Precession of a Top** *related to a TM question*

   Consider a symmetric top that is initially spinning vertically $\theta = 0$, so the two conserved angular momenta J_k and J_z as defined in the notes equal each other.

   (a) Write the effective potential for motion in θ and expand it to order θ^2.

   (b) Based on your expansion above, under what conditions is rotation with $\theta = 0$ stable? Compare this to our discussion of steady precession in the lecture notes.

   (c) Suppose that $2MgRI < J_z^2 < 4MgRI$. By considering the value of $V(\theta)$ at $\theta = 0$ and $\theta = \pi/2$ and the result of the previous part, argue that the top nutates between $\theta = 0$ and another angle $\theta_1 < \pi/2$.