Physics 340
Homework #11
due Tuesday, 13 December 2011

Turn in solutions to the following problems at the time of the exam next Tuesday. As usual, if you use outside sources or computer software to help you in your solution, note them accordingly. Include any C++ or Mathematica or Maple code that you used, together with its output.

(1) Do problem 10.41 in the text. (Regarding the hint given: We’ve already effectively done both 10.23 and 10.30 in lecture.)

(2) Consider the following passage from Richard Feynman’s memoir, Surely You’re Joking, Mr. Feynman.

I was in the cafeteria and some guy, fooling around, throws a plate in the air. As the plate went up in the air I saw it wobble, and I noticed the red medallion of Cornell on the plate going around. It was pretty obvious to me that the medallion went around faster than the wobbling. I had nothing to do, so I start figuring out the motion of the rotating plate. I discovered that when the angle is very slight, the medallion rotates twice as fast as the wobble rate—two to one. It came out of a complicated equation!\(^1\)

Follow in Feynman’s footsteps: Find the wobble rate for the rotating plate and verify his “two to one” result for small angles.

\(^1\)Feynman continues: I went on to work out equations for wobbles. Then I thought about how the electron orbits start to move in relativity. Then there’s the Dirac equation in electrodynamics. And then quantum electrodynamics. And before I knew it . . . the whole business that I got the Nobel prize for came from that piddling around with the wobbling plate. For extra credit on this problem, go on to win the Nobel Prize!