Physics 471 – Fall 2009

Homework #9, due Friday, November 13

(Point values are in brackets for each problem.)

1. [4] Griffiths problem 3.17. For parts (c) and (d), you may need to use your results from problem 3.13, which you did last week.

2. [3] Griffiths problem 3.27. If you understand quantum mechanics, you can write down the answers to parts (a) and (b) with no calculation. For part (c), you need to invert the basis transformation; i.e. you must express ϕ_1 and ϕ_2 as linear combinations of ψ_1 and ψ_2. Find the probability of getting the result a_1 if the previous measurement of B had produced b_1. Do the same if the previous measurement of B had produced b_2. Now put all of your probabilities together in the correct way to obtain the final answer. Your final answer, expressed as a fraction, should have a rather large denominator and a rather large numerator!

3. [5] Griffiths 3.37. Change part (b) to: $\left|S(0)\right\rangle = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$

   You are welcome to work out this problem using the Dirac "ket" notation, but at the end I would like you to express your answers as column vectors like the ones given in the problem. The reason for doing this is that the answer to part (b) will simplify using Euler's formula.

4. [8] Griffiths problem 3.38. This is a long problem. I want you to do it because it demonstrates many of the concepts we've been talking about over the past couple of weeks. Get started early in the week!