

Physics 125b – Problem Set 10 – Due Jan 29, 2008

Version 1 – Jan 22, 2008

This problem set focuses rotations and angular momentum, Shankar 12.1-12.5 and Lecture Notes 13.

Many basic problems in QM can be found in textbooks – there are only so many solvable elementary problems out there. Please refrain from using solutions from other textbooks. Obviously, you will learn more and develop better intuition for QM by solving the problems yourself. We are happy to provide hints to get you through the tricky parts of a problem, but you *must* learn to set up and solve these problems from scratch by yourself.

1. Shankar 12.3.2. Remember that the wavefunction does not need to be single-valued, only the probability density.
2. Shankar 12.3.7. You may skip (1), we did it in class. For (2), you will not “derive” the result by some sort of direct integration; rather do the usual thing of assuming a form for the solution and finding conditions on that form.
3. Shankar 12.4.3. You may skip (1), refer to Ph106 Lecture Notes 5.1.1. Recall the vector calculus identity $\vec{a} \cdot (\vec{b} \times \vec{c}) = \vec{b} \cdot (\vec{c} \times \vec{a}) = \vec{c} \cdot (\vec{a} \times \vec{b})$.
4. Shankar 12.5.6. Note that Shankar’s $D^{(1)}[R(\theta_x \hat{i})]$ corresponds to our $T^{(1)}(\theta_x \hat{i})$.
5. Shankar 12.5.13.