

Physics 712 Homework Problems

Homework: Sakurai problems 5.28, 5.29.

Hints:

5.28

- What is the perturbation Hamiltonian, i.e., V ?
- Which of the matrix elements $\langle 2lm|V|100\rangle$ are non-zero?
- Assume that the radial integral is some constant, let's call it A .
- Work out the angular part(s) of the remaining matrix element(s), and then the answer.

5.29

- Rewrite the perturbation Hamiltonian in terms of diagonal operators. (Which representation would you choose?).
Note: By now you should know the two representations for 2 spin-1/2 objects by heart!
- a) Develop the initial state in time, then find the amplitude for it to be in each of the desired final states.
- b) Work out the various V_{ni} . Find the various $P_n(t)$.
- Is the total probability conserved? If not, what needs to be done to fix it?