PHYS 452: Quantum Mechanics II - Fall 2016
Homework #4, due Tuesday November 1 in class

Time-dependent perturbation theory

1. Problem 9.5 in Griffiths

2. Problem 9.17 in Griffiths

3. Problem 9.18 in Griffiths

4. A flat quantum rotor (i.e. rotor constrained in xy plane) with a moment of inertia I and dipole moment d (in xy plane) is placed in a uniform electric field

$$\mathcal{E}(t) = \begin{cases} \mathcal{E}_0 e^{-t/\tau}, & t \geq 0 \\ 0, & t < 0 \end{cases}$$

where $\mathcal{E}_0$ and τ are some constants. Before the field gets turned on, the rotor is in a state with a definite projection of the angular momentum, m. What are the probabilities of various values of the angular momentum and energies at $t = +\infty$? Under what conditions the results you obtained are applicable?