

1. 14.9 (Townsend)
2. Read first 9.3.1 and then solve 9.8 (Griffiths).
3. 9.12 (Griffiths) (The commutation relations will be needed later to establish rules for allowed and forbidden transitions.)
4. 9.18 (Griffiths)
5. Consider a particle with mass  $m$  and charge  $q$  moving in a one-dimensional simple harmonic oscillator potential. The system is acted on with an oscillating uniform electric field during the time  $0 \leq t \leq T$ ,

$$\mathbf{E}(x) = E_0 \mathbf{e}_x \sin \omega t,$$

and the perturbing Hamiltonian is

$$H_1(t) = -qE_0x(\Theta(t) - \Theta(t - T)) \sin \omega t.$$

- (a) To first order in perturbation theory, compute the probability that at  $t = T$ , the system is in an excited state  $n \geq 1$ .
  - (b) Compute the transition probabilities at second order.
6. 14.7 (Townsend)