HW#7, Due May.26 (Wed) by 9:00.
No late HW will be accepted. So turn in whatever you have done.

1. (30%) By energy-momentum conservation, show that free electrons cannot absorb or emit photons (No Quantum Mechanics involved!)

2. (30%)[Time-depend perturbation on 1D SHO]
   Sakurai, Problem 5.24 (page 351)

3. (40%)[Ground state Hydrogen with time-depend perturbation]
   A hydrogen atom in its ground state initially is placed in a time-dependent electric field,

$$\overrightarrow{E}(t) = \begin{cases} \frac{\tau E_0}{\tau^2 + t^2}\hat{z} & t \geq 0 \\ 0 & t < 0 \end{cases}$$

   where τ is a constant with the dimension of time. Calculate the TOTAL probability that the atom will be found in the excited state after a sufficiently long time.