

Physics 835: Problem Set 5

Due Wednesday, February 16 by 5PM

All problems worth 10 pts. unless otherwise stated.

1. Jackson, Problem 8.6. In part (a), omit the plots. Rather than doing part (b), just find the lowest resonant frequency for a cavity of these dimensions with perfectly conducting walls. Is this a TE or TM mode?
2. Jackson, 9.3. Hint: it is sufficient to get the electric dipole fields.
3. Consider a hydrogen atom in the ground (1s) state, but assume it is treated *classically* (an electron orbiting like a planet about a proton). Treating this as a classical oscillating electric dipole moment, calculate the radiated power. How long would it take for the electron, radiating at this rate, to lose an energy equal to its kinetic energy? Why doesn't this happen in the quantum-mechanical 1s state? (A few words will suffice.)