

## Physics 835: Problem Set 4: Parts I and II

**Due Wednesday, February 9 by 5PM**

All problems worth 10 pts. unless otherwise stated.

1. Jackson, Problem (7.12). Note that the sentence beginning “Note that” merely asks you to note something, not to do anything.
2. Jackson, Problem 8.5(a).
3. (a). Consider a TM mode in a rectangular waveguide. Given  $E_z$  for this mode (as given in the footnote on page 362), find  $E_x$ ,  $E_y$ ,  $H_x$ , and  $H_y$  by suitable manipulation of the Maxwell equations.  
(b). If you look at the form of  $H_z$  given in eq. (8.42) for a TE mode in a rectangular waveguide, it may seem as if there is a mode with  $m = n = 0$ . Why is there no such mode?
4. Jackson, Problem 8.2, parts (a) and (c).
5. Jackson, Problem 8.6. **THIS PROBLEM MAY BE POSTPONED TILL THE FOLLOWING WEEK.** 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?