PHYS 333 — Problem Set #21

**Reading:** Ch. 9.1 – 9.2 (you may skip 9.1.3)

**Problems:** Due before you start the take-home exam.

1. Griffiths 9.1
2. Griffiths 9.2
3. Griffiths 9.9
4. In class on Monday we will briefly discuss standing-wave solutions of the wave equation for electromagnetic fields between two mirrors perpendicular to the $z$-axis located at $z = 0$ and $z = L$. Here are the complete results:

   \[
   \mathbf{E} = E_0 \sin \left( \frac{n\pi z}{L} \right) \cos \left( \frac{cn\pi t}{L} \right) \hat{x} \\
   \mathbf{B} = -\frac{E_0}{c} \cos \left( \frac{n\pi z}{L} \right) \sin \left( \frac{cn\pi t}{L} \right) \hat{y}
   \]

   Prove that these fields satisfy all four of Maxwell’s equations, and the wave equations for electric and magnetic fields.