Physics 214: Introduction to Quantum Mechanics  
Spring 2010  
Problem Set 2

Due: Wed 3 Feb 2010

Reading:

Fri 1/22: Secs. 1.6 and 1.7.

Mon 1/25: We will discuss diffraction from two slits of finite width (not in textbook).

Wed 1/27: Sec. 1.8.

Problems (continued on other side):


2. Double slit diffraction. In a double slit diffraction experiment, yellow helium light of wavelength $\lambda = 587.6$ nm produces fringes of separation $\Delta y = 0.50$ mm on a screen 2.25 m away. What is the distance between the slits? (Hint: you will need to use the small angle approximation $\sin \theta \simeq \tan \theta = y/L$.)


5. Interference from a thin glass. Townsend Problem 1.24. In part (b), you will need the result of Problem 1.22: the wavelength of the photon in air is $\lambda = 706$ nm.

Note: The transmission amplitude $t$ and reflection amplitude $\pm r$ (both assumed to be real in this problem) satisfy $|t|^2 + |r|^2 = 1$. However, we are told to neglect multiple reflections. For consistency, this means that we keep $r$ but neglect $|r|^2$ everywhere it appears. In this approximation, $|t|^2 = 1 - |r|^2 \simeq 1$.

6. Michelson interferometer. Townsend Problem 1.27. For the ordinary (100% reflecting) mirrors $M_1$ and $M_2$, please assume hard reflections as in Townsend Fig 1.23.
7. **Feedback.** By Thursday of each week, please send me an email message to provide feedback on the class and on your reading. (My email address is mbschulz at brynmawr.edu). For example: Which parts were easier or harder to understand? Do you have any questions that you would like to clarify or areas where you would like more practice in recitation section? Was there something that you found particularly interesting or uninteresting? Was the problem set of reasonable length and difficulty. The textbook we are using is brand new, so we are on the cutting edge. If you have any thoughts on how to improve the textbook for future students using future editions, please let me know and I will pass that information on to the author, John Townsend. The purpose of the feedback is to help you to reflect on your learning process and to provide me with brief but valuable information that will help to make this class the best possible experience for everyone.