University of California, Berkeley
Physics 7C Spring 2002

**Problem Set 5**
**due March 7, 2003**

**Reading assignment:** Giancoli, chapter 36, beginning of chapter 37.

1. (variant of Giancoli 13) If a double-slit pattern contains exactly nine fringes in the central diffraction peak, what can you say about the slit width $a$ and separation $d$?

2. Giancoli, Problem 18 (uses section 3)

3. Giancoli, Problem 20

4. (variant of Giancoli, 32) The first order line of 640 nm light falling on a diffraction grating is observed at a 15.5° angle. How far apart are the slits? At what angle will the third order be observed? A first order maximum is the maximum right next to the central ($\sin\theta = 0$) maximum, third order is the third maximum away from the central maximum, etc.

5. (variant of Giancoli, 47) At what angle should the axes of two Polaroids be placed so as to reduce the intensity of the incident unpolarized light to (a) 1/5, (b) 1/9? You can leave your answer in terms of the cosine of the angle between the two Polaroids.

6. (variant of Giancoli, 55) A teacher stands well back from an outside doorway 0.88 m wide, and blows a whistle of frequency 700 Hz. Ignoring reflections, estimate at what angle(s) it is *not* possible to hear the whistle clearly on the playground outside the doorway. Assume that the speed of sound is 343 m/s.

7. Giancoli 63 (diffraction grating)

8. Giancoli 68

9. Chapter 37, problem 7

10. Chapter 37, problem 10

Please show your work so that the grader can give you credit for effort even if you get the wrong answer. For keeping track of your own work it is usually helpful to only plug in numbers at the end. Also, please try to make your work readable!