Astronomy 80B: Light
Problem Set 3: due 24 April 2003

• **A.** In class we stated that for a black body the thermal emission is maximum for electromagnetic radiation having a wavelength λ_{max} given by

λ_{max} T = L where L = 2.9×10^{-3} m·K.

What is λ_{max} for T = 5700°K (roughly the temperature of the sun)
What is λ_{max} for T = -196°C? (the temperature of liquid nitrogen) Remember that the coldest possible temperature is 0°K (Kelvin) or -273°C (Celsius).

• **From Ch 2** in *Seeing the Light* do the following problems:
mathematical problems

• page 71: PM2, PM3, PM5

• **Read Appendix B** (p416)

• **B.** Consider the game of pool or billiards. Assuming that a pool ball acts like a photon and the sides of the pool table act like mirrors (real pool balls can spin and this complicates their interaction with the pool table cushions) carefully draw examples of the paths the white ball takes (the one you strike with the pool cue) in hitting another ball on the table. Make sure your drawing indicates the conceptual accuracy of your drawing. A straight edge is a good idea for this problem.

a) direct shot hitting the second ball, without hitting an edge
b) shot hitting one edge before hitting the second ball
c) shot hitting two edges before hitting the second ball
d) shot hitting four edges before hitting the second ball
e) go play a real game of pool with a classmate and study how well photons and mirrors approximate real pool balls and tables. Is it an interesting approximation?

• **Read Ch 3** in *Seeing the Light* and do the following problems:
You will want a straight edge and graph paper for some of these problems

• page 101: P1 (also see ponder on p. 73), P3, P4, P5
harder problems:

• page 101-102: PH3, PH5