Astronomy 80B: Light
Problem Set 1: due 10 April 2003

• Read Ch 1 in *Seeing the Light*   and do the following problems:
   – Problems P5, P11, P12, P13, P17, P18, P19, P20

   – Harder Problems PH2, PH7

• Read Appendix A in *Seeing the Light,* (p. 415)

   – Mathematical problems PM 2, PM6, PM8 on p. 26

• **A.**   Consider a river with two piers on one side, separated by 1 mile. The width of the river is also 1 mile. The speed of the river is 1 mile per hour. Two swimmers of identical ability (Michelson and Morley, who swim at 2mph) both leave the upstream pier at the same time. Michelson swims across the river to a point on the opposite bank even with the upper pier, and then back to the upper pier. Remember that Michelson is swimming across the current, so he must swim "upstream" somewhat in order to remain on the line between the pier and opposite bank. Morley swims downstream to the second pier and then swims upstream to the upstream pier.
   Who gets back first?
   How long did it take each of them?
   What would the result be if the river wasn't moving?
   What could they have concluded if they had arrived back at the same time? Do you see why they were so surprised when they did this with light and saw no difference in arrival times.