

## **Astronomy 80B: Light Problem Set 5: due 8 May 2003**

• **Review 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 102: P14, P15, P16

atmospheric effects

- page 71: PH18

• **Read Ch 4** in *Seeing the Light* and do

- page 142: P1, P3, P5, P6

• **A.** An optical designer has a lens with chromatic aberrations. Knowing that curved mirrors have optical power he sets out to fix the chromatic aberration by adding a carefully designed curved mirror. After much work he fails to come up with a good design. He complains of his failure to an Ay80B student who immediately tells him why he failed. What did she say?

**B.** John gives Sally a huge diamond ( $n = 2.4$ ) engagement ring 20 carats in size. She doubts John can afford such a huge diamond but he swears its real and a measure of his love. After John leaves, Sally (who did well in Ay 80B) mixes up a sugar-water solution (index of refraction 1.33 to 1.50 depending on sugar concentration ) and plunks the ring in the solution in a simple drinking glass. She peers into the glass and then calls up John to say the engagement is off. What did she see? Quartz and many glasses have a range of index of refraction  $n = 1.45$  to  $1.50$ .