HOMEWORK #6 (Due 1:30pm May 18th)

Problem 1: **Lensing by a Point Mass**
   Ryden 7.3

Problem 2: **Gravitational Lensing by a Galaxy**
   The Einstein Cross is a set of five images of a quasar at redshift $z=1.695$, shining through a spiral galaxy, 2237+0305, at $z=0.039$. Four of the images lie close to a circle of radius 0.9 arcseconds.
   (a) What is the distance to the spiral galaxy?
   (b) Estimate the mass of the spiral galaxy within this radius. [Hint: Notice that $d_s \approx d_{LS}$, and see the lecture notes.]

Problem 3: **Recombination and Baryon/Photon Ratio**
   Ryden 8.1

Problem 4: **Helium Recombination**
   Ryden 8.3