

## AST 475/875 Homework #7

*Due Th, Oct 21<sup>st</sup>*

The Crab nebula is detected as a point source by a broad beam radio telescope. The measured spectral flux density at 1 GHz is  $S=700$  Jy. The Crab has an angular size of about  $3'$  x  $5'$ .

- a) What is the specific intensity  $I$  of the detected radiation, averaged over the surface of the nebula?
- b) What is the surface brightness of the nebula at 1 GHz, averaged over the surface?
- c) What are the linear dimensions (in m or light-years as you choose) that correspond to the angular sizes  $3'$  and  $5'$  if the Crab is at a distance of 6000 LY?
- d) What is the approximate radio luminosity of the Crab over a band of frequencies of 0.5-5.5 GHz? (Adopt the flux density at 1 GHz for the entire band). How does this compare with the luminosity of the Sun?