

AST 300B – Spring 2017
In-class Problem Due: Friday January 20

2. Assume that the Sun radiates isotropically. Let R be the radius of the Sun, let F be the flux density on the surface of the Sun, and let f be the flux density observed at a distance r away from the surface of the Sun.
- (a) Derive an expression for how f depends on r ? (Hint: consider the Luminosity and assume no energy is lost between the surface of the Sun and a sphere with a radius of r .)
 - (b) From a distance of $r \gg R$, what solid angle, Ω , does the Sun subtend?
 - (c) Define the average surface brightness, B , of the Sun as the observed flux density at a distance r divided by the observed solid angle of the Sun from a distance r ($B = f/\Omega$). What famous photometric quantity is the surface brightness equal to (prove your answer)?
 - (d) How does the surface brightness of the Sun depend on r ? This result is fundamental to why we use this photometric quantity.

