Galaxies and Extragalactic Astronomy

Exercise 2: According to the generalized surface luminosity profile (or Sersic profile), the surface luminosity of a galaxy is:

$$I(R) = I_e \times exp\left\{-b_n \left[\left(\frac{R}{R_e}\right)^{\frac{1}{n}} - 1\right]\right\}$$

where R is the projected radius

For a standard spiral galaxy we have n=1

1) Show that in this case the luminosity L(R) is equal to:

$$L(R) = L(\infty)\left[1 - e^{-y}(1 + y)\right]$$

where $y = b_n \left(\frac{R}{R_e}\right)$

2) What is the value of b_n that makes R_e be the half light radius (that is, $L(R_e) = L(\infty)/2$)?