Supernova Remnants

Start from the equation

$$V_s = \left(\frac{(\gamma + 1) K E_0}{4\pi \rho_1 R_s^3} \right)^{1/2} . \qquad (1)$$

which is one of the conditions for self-similar solutions to exist (in the Sedov-Taylor phase of SNR evolution). Integrate directly to derive the variation of R_s (shock radius) as a function of time. Express your result using R_s in pc, E_{51} the initial energy of the explosion in units of 10^{51} ergs, n_1 the density of the pre-shock medium in cm^{-3} and t_4 the age of the SNR in units of 10^4 yrs. You can take $\gamma = 5/3$.
Keep K as a variable.

Gamma Ray bursts

Supposed that sources are distributed homogeneously in Euclidien space, i.e that the density and the luminosity function are independant of the position of space observed. Show that the number of sources with a luminosity larger than a value P is then proportional to $P^{3/2}$. Compare with the graph below derived from 796 bursts from BATSE. What can you deduce from that?