Galaxies and Cosmology
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. please return this question sheet by: September 27, 2006

Problem 1 – Initial mass function (7.5 pt)

Assume you have a survey that gives you stellar distances and luminosities for stars closer than 100 pc and brighter than 13th apparent magnitude in V-band. The number of stars per magnitude bin, $\Delta M_V = 3$ mag, is

M_V	15	12	9	6	3	0	-3
#	16	470	15190	30300	5300	470	43

Compute the luminosity function and estimate the initial mass function (IMF). Assume a simplified luminosity-mass relation $L = (M/M_\odot)^4\, L_\odot$ and a constant star formation history of 10 Gyr. What is the slope of the IMF? Note that the luminosity function is given per magnitude interval while the IMF is given per mass interval.

Problem 2 – Jump in stellar spectra (2.5 pt)

Stellar spectra show a characteristic break at about 380 nm, in particular B, A, and F stars, see figure of stellar spectra in the handout. Explain how this jump come into being.