

Midterm Review Questions

Mar 4, 2014

1 Logistics

- The exam is Mar 11 (Tuesday), from 2:00pm - 3:30 pm, in SO 204.
- I will be in office most of the day Monday (Mar 10, before 4:30pm) to answer questions.
- Needed equations and numerical constants will be provided. Please bring calculator.
- The exam will have two parts: (a) Concept questions, definitions 40%; (b) Quantitative question, 3 questions that need derivations, 60%.
- Example of concept question: what's the Schechter luminosity function of galaxies. Your answer should include something like: luminosity function describes the spatial density of galaxies per unit luminosity at certain luminosity. The Schechter function is: $\Phi(L)dL = n_*(L/L^*)^\alpha \exp(-L/L^*)dL/L^*$, which is exponential at the bright end and power-law in the faint end.
- Quantitative questions are more or less like the homework, with multiple steps, and will not include very long numerical manipulations. But some simple calculations are included.

2 Topics

- §2.1 – luminosity function; mass function; IMF; Salpeter IMF; Schechter function
- §2.2 – spectroscopic parallax; thick disk; isochrone fitting;
- §2.3 – Oort constants; rotation curve
- §3.1 – Poisson equation; free-fall time; virial theorem
- §3.2 – strong encounter; relaxation time; crossing time; evaporation time; mass segregation
- §3.3 – effective potential; epicycle frequency
- §4.1 – dwarf ellipticals; dwarf spheroidals; tidal limit
- §4.3 – dwarf irregulars

- §5.1 – isophote magnitude; exponential law; double exp law
- §5.3 – mass-to-light ratio; Tully-Fisher relation; peculiar velocity; starburst galaxy
- §6.1 – de Vaucouleurs law; Sersic profile; cD galaxy;
- §6.2 – Faber-Jackson relation; Fundamental plane; velocity anisotropy; violent relaxation