

AY12 Review Section for Midterm

Note: The notes Stan gave out in class are much more complete. These were just to hit on some of the points that I thought were important.

General Astronomy

- Visibility of stars at various declinations
- Sidereal time and its relation to longitude
- Milky way properties
 - Disk, Bulge, Halo
- Other types of galaxies: elliptical galaxies, spiral galaxies
- What are the differences in the physical characteristics of ellipticals and spirals?
 - Stellar populations: Spirals = younger, ellipticals = older
 - Gas content
 - Formation histories

Stars and Stellar Populations

- What are the most abundant stars?
 - What color are they?
 - Where in the evolutionary sequence are they?
 - Is the sun one of the more common stars?
- Some stars are found in clusters
 - What are the types of clusters and what distinguishes them?
- Solar Properties
 - How old is the sun?
 - What part of the evolutionary sequence is it on?

Fundamental Astrophysics

- Four forces
 - What are they in order of decreasing strength?
- Kepler's Laws
 - What does the second law imply about the velocity of planets as a function of their orbital position?
 - Know how to apply Kepler's third law to find masses and distances
- Orbital velocity vs. escape velocity
 - Relation to energy conservation and binding
- Energy in Astrophysics
 - Kinetic energy, what are the types and the formulae for these
 - Gravitational potential energy, how does this relate to the escape velocity?
 - What is the Kelvin Helmholtz timescale conceptually?
 - What is the equation for the Kelvin Helmholtz timescale?

Distance Measures

- Radar
- Kepler's third law
- Parallax
- Standard Candles
 - Cepheid variables
 - Tully-Fisher and Faber-Jackson Relations
 - Type Ia supernovae

Electromagnetic Radiation

- Photon energies
 - As photon wavelength gets shorter does the energy get higher or lower?
 - What is the formula for photon energies?
- Black Body Spectra
 - How many parameters determine the properties of a blackbody and what are they?
 - How does the temperature relate to the peak wavelength?
 - Relative stellar temperatures from peak wavelengths
 - What is the flux per unit area of a Black body surface?
- Luminosity in terms of stellar radii and temperatures

Atomic Physics and Radiation

- Quantization of energy levels in atom
 - What is the electron wavelength?
 - How does quantization relate to electron wavelength?
 - How do the energy levels depend on the principal quantum number?
 - How many electrons can I fit into a given electronic state?
 - How does this relate to degeneracy pressure?
- Atomic transitions
 - Given the energy levels of an atom, what is the energy released in a downward transition?
 - What type of gas gives rise to emission lines?
 - What type of situation is required for absorption lines?
 - Why is the sky blue?
- Absorption line strengths
 - In a stellar atmosphere, what determines the strength of a line?

Atomic Physics and Radiation

- Stellar types
 - OBAFGKM: Sequence in temperatures gives rise to sequence in spectral features
 - What spectral features are seen in an O star, why?
- Doppler shift
 - What gives rise to the Doppler shift in light?
 - Which effects give rise to line broadening?