Outline of Course Material: Test 3 (Keyed to the textbook)

Since the material covered since test #2 comes from different chapters of the text, I am listing the material in the order it was covered in lecture. The numbers refer to the chapter and section in the text. I am attaching a list of terms and names to know by chapter to the end of this review sheet.

21-2 Star Clusters: Open clusters and globular clusters. What are the characteristics of open clusters and globular clusters? Which contain more stars? How are their shapes different?

21-3 H-R Diagrams of Young and Old Clusters: What is the turn-off point? How do we determine the age of a cluster from the turn-off point? There is more information in the notes than the book. In general are open clusters younger or older than globular clusters? How can you tell by looking at the H-R diagram?

18-2 Surveying the Stars: Parallax and the definition of the parsec. Given the parallax can you calculate the distance to the star? See notes for Alpha Centauri example calculation.

18-3 Variable Stars: Read carefully and know the boldface terms. What is the period-luminosity relationship? Who discovered it? What is a Cepheid?

18-4 The H-R diagram and Cosmic Distances: Read carefully and see notes for more details on spectroscopic parallax. What is the formula for absolute magnitude in terms of the apparent magnitude and distance in parsecs?

24-1 The Architecture of the Galaxy: Read carefully and know the boldface terms. Figure 24.5 shows a schematic view of the Galaxy. Where is the Sun in the Galaxy? What are the halo, the nuclear bulge, and the disk? How did Harlow Shapley use the distribution of globular clusters to estimate the position of the center of the Galaxy? Interstellar matter in the Galaxy, especially in the disk, and its connection to star formation.

24-2 Stellar Populations in the Galaxy: Populations I and II. Which is the older population? How does the abundance of elements heavier than He differ between the populations?

24-6 The Formation of the Galaxy: protogalactic cloud. What is the connection between time of formation during the collapse of the Galaxy and Populations I and II?

19-1 The Interstellar Medium: Read for background information.

19-2 Interstellar Gas: Read carefully and know all boldface terms. What is an HII region? How is it associated with hot, young stars? How do we observe neutral hydrogen clouds and what process leads to 21-cm radiation? What is the connection between dust and molecular clouds? Table 19.1 is a useful summary.

19-3 Cosmic Dust: Read carefully and know the boldface terms.

19-4 Model of the Interstellar Gas: Read for background information.

24-3 Spiral Structure of the Galaxy: Read carefully and know the boldface and italicized terms. What is differential rotation? How does the density wave theory avoid the "winding up" problem? How can random star formation and differential rotation mimic spiral structure (this is the chaotic theory explained more fully in the lecture than the book). What is the connection between giant molecular clouds, massive young stars, and the visibility of spiral arms?

24-4 Mass of the Galaxy: Read carefully. What is a rotation curve? How does the rotation curve of our Galaxy suggest the existence of a dark matter corona?

24-5 The Nucleus of the Galaxy: What is the evidence there may be a massive black hole at the center of the Galaxy. What is Sagittarius A? What is an accretion disk?
20-1 Star Formation: Giant molecular clouds, the competition between gravity and pressure, the Orion nebula, protostars, stellar winds and bipolar jets, Herbig-Haro objects. Why are protostars found in molecular clouds and often found near HII regions? Why are protostars easier to observe at infrared wavelengths than the visible?

20-2 H-R Diagrams and the Study of Stellar Evolution: pre-main sequence stars, zero-age main sequence (ZAMS), evolutionary tracks. Fig. 20.11 is useful to study. What is the energy source of a pre-main sequence star? Why is it luminous even though it has a low temperature?

21-1 Evolution from the Main Sequence to Giants: hydrogen shell burning, contracting helium core, expansion and cooling of the envelope of star, luminosity and surface area. Why does a star evolve from left to right and then up from the main sequence as it ages?

21-4 Further Evolution: Helium flash, triple alpha process, mass loss from Giant stars, re-ascent of the giant branch, carbon-nitrogen-oxygen core. Figure 21.14 is worth study.


22-1 The Death of Low Mass Stars: The contracting core and degenerate matter, white dwarfs, the Chandrasekhar limit, mass loss and planetary nebulae. Figure 22.7 is a follow up to Fig. 21.14.

22-2 Evolution of Massive Stars: Neutron stars, Type II supernovae, neutrino emission, ejection of heavy elements into the interstellar medium, and observations of supernova remnants.

22-3 Pulsars and the Discovery of Neutron Stars: Read for background information.

22-4 The Evolution of Binary Star Systems: Recurrent novae and binary star systems vs. Type I supernovae.

Test #3

Terms to Know:

Chapter 18: parallax, parsec, Cepheid variable, RR Lyrae variable, period-luminosity relationship, pulsating variable, light curves, spectroscopic parallax.

Chapter 19: nebulae, interstellar gas, interstellar dust, HII regions, 21-cm radiation, neutral hydrogen clouds, molecular clouds, dark nebulae, extinction, reddening.

Chapter 20: giant molecular clouds, Orion nebula, protostar, stellar wind, Herbig-Haro objects, evolutionary tracks, zero-age main sequence, proto-planetary disks

Chapter 21: red giant, shell-burning, core, open clusters, globular clusters, turn-off point, triple alpha process, helium flash, mass loss, nucleosynthesis.

Chapter 22: degenerate matter, white dwarf, Chandrasekhar limit, planetary nebulae, neutron star, supernova, neutrino, pulsar, mass transfer, nova.

Chapter 24: Milky Way, Galaxy, halo, nuclear bulge, disk, spiral arm, differential rotation, spiral density wave, Populations I and II, rotation curve, dark matter, corona, nucleus, black hole, accretion disk, Sagittarius A, protogalactic cloud.

Names to Know: