

Name:

ASTRONOMY 1102 - Section 1

Instructor: Juhan Frank

Fall 1999

Homework # 7 due Wed. Dec. 1

Galaxies and The Universe

1) Compare the HR diagrams shown on page 512. Given our present understanding of the chemical enrichment of the ISM by successive generations of stars, identify which of the clusters shown is likely to have the lowest and the highest metal abundances. Refer to section 18.1 and Fig. 18.2.

2) Compare the densities and temperatures of the different phases of the galactic ISM listed on table 18.1, p. 574. Which phases are in pressure equilibrium, which are not and why.

3) Study the orbits shown on Fig. 18.18. Explain why Pop. I stars and Pop. II stars have different types of orbit.

4) How do astronomers conclude that the Galaxy has a lot of dark matter, especially out in the halo. Look through the figures in the remaining chapters of the text and find one that shows evidence that there is dark matter also in spiral galaxies other than the Galaxy.

5) Which Population do the following objects belong to?
Spiral arms, open clusters, globular clusters, a high velocity star whose orbit cuts through the disk at an angle of 60 degrees, an M2V star moving in a circle on the plane of the Galaxy, an OB association (a loosely bound group of mainly O and B stars), the galactic bulge.

6) Why are S galaxies bluish while E galaxies are reddish?

7) What is the approximate luminosity of a Cepheid with a period of 30 days? If a G2V star can be detected out to a distance of 1 Mpc, how far could we detect such a luminous Cepheid?

8) If the Hubble constant were equal to 100 km/s/Mpc, what would be the distance of a galaxy moving away from us at 10,000 km/s?

9) If the age of the Universe is 15 billion years for a Hubble constant of 65 km/s/Mpc, what would be its age for a Hubble constant of 100 km/s/Mpc?

10) Can galaxies exist at distances exceeding 100 billion LY?
Can they be seen?