Astronomy 120: Assignment 6 The Milky Way, galaxies and AGN

- 1. Why are metals less abundant in older stars than younger stars? Describe the 2 main populations that astronomers divide stars into according to their age, chemical enrichment and where they are found in the Milky Way. [6]
- 2. Describe the following properties of a globular cluster: position in the Milky Way, number of stars, colour of stars, approximate ages. Give two differences between globular clusters and open clusters (look back at the chapters on young stars).[6]
- 3. We observe that the H alpha line ($\lambda = 656.3$ nm) in a faint galaxy is shifted to an observed wavelength of 667.8 nm. Using Hubble's law, calculate how far away this galaxy is (assume H= 70 km/s/Mpc). For a bonus mark: if there is dust in the Milky Way, how would this affect our calculation? [6+1]
- 4. At http://www.astro.uvic.ca/~sara/A120/ASSIGNMENTS/A9.html are 3 pictures of galaxies, with some additional information about their properties. Using the information in your notes on the Hubble sequence, classify these galaxies by Hubble type and *justify your choice* [6].
- 5. Consider a quasar that is 5×10^9 pc away from us. Because the quasar looks like a point source from Earth, it must have a size less than about 1 second of arc. What is the maximum linear diameter (i.e. real diameter) of this quasar (in parsecs)? If we use a space telescope, we can get better resolution, down to 0.1 second of arc, but the quasar still looks like a point source. What is the maximum size we infer from these space observations? If the quasar is variable, how might this help us get a better estimate of its size (hint think back to pulsars).

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