ASTR 400B Homework 2

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1. The total of MW and M31 are the same at 2.06 10^{12} M$\odot$. The halo mass dominates both systems, each having a halo mass of over 1.9 10^{12} M$\odot$.
2. The stellar masses , that being the combined Disk and Bulge masses, are different. MW has 0.08510^{12} M$\odot$ while M31 has 0.13910^{12} M$\odot$. As M31 has nearly twice the visible mass, i.e. stellar mass, of MW, I expect M31 will be more luminous.
3. MW has 1.975 10^{12} M$\odot$ of Halo which gives it a ratio of 95.87% dark matter and M31 is 1.921 10^{12} M$\odot$ Halo or 93.25% dark matter. The Halo mass of MW and M31 are comparable as are the ratios with only a minor difference in values. This is strange, one would think that M31's large stellar mass would indicate a larger galaxy in general including dark matter, but we don't see that. Also that vast difference in stellar mass create almost no change in the ratios, despite similar Halo masses, which goes to show how little of much of a galaxies mass is dark matter.
4. For MW the ratio of the stellar mass to the total mass is 4.12%, in M31 it is 6.75% and in M33 4.59%. This percents is significantly smaller than the baryon fraction of the ration the universe, by about 10%. This is likely because the structure of the wider universe is different from that of galaxies. It could be that unusually dense clumps of matter attract the stellar matter that galaxies are made of. It could also be the opposite, that a dense region of baryon matter seeded a galaxy which in turn attracted large amounts of dark matter.