ASTR400B HW2 Table

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Galaxy Name	Halo $10^{12} M_{\odot}$	Disk $10^{12} M_{\odot}$	Bulge $10^{12} M_{\odot}$	Total $10^{12} M_{\odot}$	f_{bar}
MW	1.975	0.075	0.01	2.06	0.041
M31	1.921	0.12	0.019	2.06	0.067
M33	.187	0.009	0.0	0.196	0.046
Total				4.316	

Table 1: Mass distribution of MW, M31, and M33

Total Mass of Local Group = 4.316 $10^{12} M_{\odot}$

Part 4 Questions:

1. The total mass of both MW and M31 are nearly identical (2.06 $10^{12} M_{\odot}$). The mass is dominated by the Halo mass (dark matter).

2. When it comes to stellar mass M31 contains more. M31 has around 0.139 $10^{12} M_{\odot}$ whereas the Milky Way only has 0.085 $10^{12} M_{\odot}$. Because there are more stars (nearly twice as many) we would expect M31 to be more luminous.

3. Comparing the total dark matter mass of the two larger galaxies gives a ratio($\frac{MW}{M31}$) of 1.03. It is surprising as you would expect that a galaxy with more stellar mass would thus have more dark matter. However, here we see that the galaxy with a greater stellar mass has less dark matter.

4. The ratio of stellar mass to total mass for each of these galaxies are, 0.041(4.1%) for MW and 0.067(6.7%) for M31. The ratio for the universe ($\frac{\Omega_b}{\Omega_m}$ $\tilde{1}6$%) Includes significantly more baryon mass than the galaxies do. My guess for why there is likely much more baryon mass in the universe than in galaxies in general is because there could be lots of gas between galaxies that is not a part of a galaxy and thus adds to the baryon mass without adding to dark matter like mass in a galaxy would.