Answers for Homework 3, ASTR400B

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Galaxy Name	Halo Mass $(10^{12}M_\odot)$	Disk Mass $(10^{12}M_\odot)$	Bulge Mass $(10^{12}M_\odot)$	Total $(10^{12}M_\odot)$	f_{bar}
Milky Way	1.975	0.075	0.01	2.06	0.041
M31	1.921	0.12	0.019	2.06	0.067
M33	0.187	0.009	0.0	0.196	0.046
Local Group	4.083	0.204	0.029	4.316	0.054

1. The Milky Way and M31 have the same total mass in this simulation. The dark matter halo mass component dominates both galaxies.

2. M31 has more stellar mass than the Milky Way. Therefore, I would expect M31 to be more luminous.

3. The Milky Way has more dark matter mass than M31 in this simulation. The dark matter mass ratio of the Milky Way versus M31 is around 1.0281. This isn't surprising, since both galaxies have the same total mass, but M31 has more stellar mass than the Milky Way.

4. The stellar to total mass ratio of the Milky Way is 0.041, or 41%. For the M31, the ratio is 0.067, or 67%. Both ratios are far greater than the ratio of the universe, which is 16%. I suspect the ratio for the whole universe is so low compared to these two spiral galaxies is because our universe also has a lot of objects that are extremely scant in stellar mass, like ultra-faint dwarf galaxies. These objects, having such few stars to begin with, cause the stellar to total mass ratio of the whole universe to go down.