Olivia Jones ASTR400B HW2

Galaxy Name	Halo Mass (10e12 M_sun)	Disk Mass (10e12 M_sun)	Bulge Mass (10e12 M_sun)	Total (10e12 M_sun)	fbar
Milky Way	0.197 solMass	0.007 solMass	0.001 solMass	0.206 solMass	0.041
M31	0.192 solMass	0.012 solMass	0.001 solMass	0.206 solMass	0.067
M33	0.018 solMass	0.0009 solMass	zero	0.019 solMass	0.047
Local Group	zero	zero	zero	0.431 solMass	zero

1.How does the total mass of the MW and M31 compare in this simulation? What galaxy component dominates this total mass?

Mass of both galaxies are the same. Halo Mass, or dark matter is the largest component of the total mass.

2. How does the stellar mass of the MW and M31 compare? Which galaxy do you expect to be more luminous?

The stellar mass for M31 is larger than the stellar mass for MW. M31 should be more luminous since it has more baryons.

3. How does the total dark matter mass of MW and M31 compare in this simulation (ratio)? Is this surprising, given their difference in stellar mass?

MW has 1.03 times more dark matter (halo mass) than M31. Not surprising as we would expect dark matter mass to be proportional to stellar mass.

4. What is the ratio of stellar mass to total mass for each galaxy (i.e. the Baryon fraction)? In the Universe, Ω_b/Ω_m ~16% of all mass is locked up in baryons (gas & stars) vs. dark matter. How does this ratio compare to the baryon fraction you computed for each galaxy? Given that the total gas mass in the disks of these galaxies is negligible compared to the stellar mass, any ideas for why the universal baryon fraction might differ from that in these galaxies?

MW fbar = 0.041, M31 fbar = 0.067, M33 fbar = 0.047

The ratio in these galaxies is much less than the ratio in the universe.

The galaxies have less baryons inside of them compared to the universe, so this is why the baryon fractions differ.