

# ASTR 400B HW3 Table & Questions

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January 2023

## 1 Table

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
Andromeda	1.921	0.12	0.019	2.06	0.067
Triangulum	0.187	0.009	0	0.196	0.046

## 2 Questions

1. Milky Way and Andromeda have the same total mass. Both galaxies' total masses are dominated by their dark matter halos.
2. Andromeda has disk and bulge stellar masses  $\approx$ twice that of the Milky Way. Assuming both galaxies have comparable stellar populations and gas extinctions, this means that Andromeda should be about twice as luminous as the Milky Way.
3. Milky Way and Andromeda have very similar dark matter halo masses despite stellar masses varying by a factor of two. This is surprising, as it implies that dark matter and stellar masses are not strongly correlated (at least in this  $N = 2$  sample).
4. Milky Way, Andromeda, and Triangulum all have baryon fractions significantly below the universal average. This implies either that the local group has a baryon fraction significantly below the universal average or that the non-spiral-galaxy universe (dwarf galaxies, elliptical galaxies, circumgalactic medium, etc.) is less dark matter rich than spiral galaxies.