

HW 6, #3

We adopt Faber-Jackson relationship

$$\log_{10} L_K = 11.5 + \frac{1}{0.11} \left[\log_{10} \sigma_c - 2.415 \right]$$

where L_K is luminosity of galaxy in K-band, and σ_c central velocity disper.
For NGC 1272, $\sigma_c = 285$ km/s. Thus

$$\log_{10} L_K = 11.86 \rightarrow L_K = 7.28 \times 10^{11} L_{\odot}$$

Now, Sun's abs mag in K-band is $M_{\odot} = 3.27$, so we can find abs mag of NGC 1272

$$M_K = M_{\odot} - 2.5 \log_{10} \left(\frac{L_K}{L_{\odot}} \right) = -26.39$$

According to NED, the apparent mag of NGC 1272 is

$$m_K \approx 8.7$$

So

$$m_K - M_K = 35.09$$

$$\rightarrow d = 10^{0.2 \{ (m-M) + 5 \}}$$

$$= 104 \text{ Mpc}$$