the luminosity of an RR-Lyrae star).

d) $L = 4\pi d^2 F$

For Cepheids $L_c = 4\pi d_c^2 F_{min}$

For RR Lyrae $L_{RR} = 4\pi d_{RR} F_{min}$

Dividing L_c by L_{RR}

$$\frac{L_c}{L_{RR}} = \frac{4\pi d_c^2 F_{min}}{4\pi d_{RR}^2 F_{min}} = \frac{d_c^2}{d_{RR}^2}$$

$$\frac{L_c}{d_c^2} = \frac{L_{RR}}{d_{RR}^2} \quad (1)$$

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e) $d_{RR}^2 = \frac{L_{RR}}{L_c} \times d_c^2$

(Rearranging (1))

$\frac{L_{RR}}{L_c} \approx \frac{1}{30}$ OK $\frac{1}{30}$

$d_{RR}^2 = \frac{1}{30} \times (10\,Mpc)^2$

$= 3.33\,Mpc^2$

$d_{RR} = \sqrt{3.33\,Mpc^2}$

$= 1.825\,Mpc \approx 1.8\,Mpc$

(If $\frac{L_{RR}}{L_c} = \frac{1}{400}$, $d_{RR} = \sqrt{\frac{1}{400}(10\,Mpc)^2}$

$= 0.5\,Mpc$)

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Not useful for extragalactic distances

$\frac{L_{RR}}{L_c} \sim 100$

$\Rightarrow d_{RR} \sim 1\,Mpc$

You have overlooked the last part of the question

f) If globular clusters are like miniature elliptical galaxies, the velocities of stars within them should be randomly distributed and we can use the virial theorem. This theorem relates a statistical quantity called the velocity dispersion, σ, to the quantity $\left(\frac{M}{R}\right)^{1/2}$, where R is a measure

velo's do not have to be 'random' for Virial Th. to be valid