32. First, we find the speed of the receding galaxy from Eq. 38-30:

$$\begin{aligned}\beta &= \frac{1-(f/f_0)^2}{1+(f/f_0)^2} = \frac{1-(\lambda_0/\lambda)^2}{1+(\lambda_0/\lambda)^2} \\ &= \frac{1-(590.0\,\text{nm}/602.0\,\text{nm})^2}{1+(590.0\,\text{nm}/602.0\,\text{nm})^2} = 0.02013\end{aligned}$$

where we use $f = c/\lambda$ and $f_0 = c/\lambda_0$. Then from Eq. 45-19,

$$r = \frac{v}{H} = \frac{\beta c}{H} = \frac{(0.02013)(2.998\times 10^8\,\text{m/s})}{19.3\,\text{mm/s}\cdot\text{ly}} = 3.13\times 10^8\ \text{ly}\ .$$

(Note: if one uses the classical Doppler shift formula instead of the relativistic version in Eq. 38-30, one obtains $r = 31.7\times 10^8\,\text{ly}$, which is reasonably close to the value we obtained above. This is to be expected since $\beta \approx 0.02 \ll 1$.)