Coding in advance of the April 22, 2019 class

Please perform the analysis described in detail in Lecture 12 on the same baryonic Tully-Fisher data set of 118 points that we have used for the last two assignments. For this analysis, you should include the uncertainty in *both* the log of the baryonic mass and the log of the rotation speed. Using this approach, perform the analysis that you performed before when you only included the uncertainty in the baryonic mass. That is, using the same model

$$\log_{10} M_{\text{bary}} = \tan \theta \log_{10} v_{\text{rot}} + b \tag{1}$$

as before, you should:

1. Go through a reasonably fine grid in θ and b to determine the minimum χ^2.

2. Determine the values of θ (in radians) and b that minimize χ^2.

3. Comment about whether this minimum χ^2 indicates a good fit.

4. Find the $\Delta\chi^2 < 2.3$ region in $\theta - b$ space, and plot them.

5. Use your grid of b and θ to produce marginalized posterior densities $P(b)$ and $P(\theta)$, and plot them.

You should have written your previous codes in such a way that you can simply plug in the new approach to computing χ^2, and otherwise output the quantities above. You can again test your codes by comparing with my results on the reduced data set.

Good luck!