

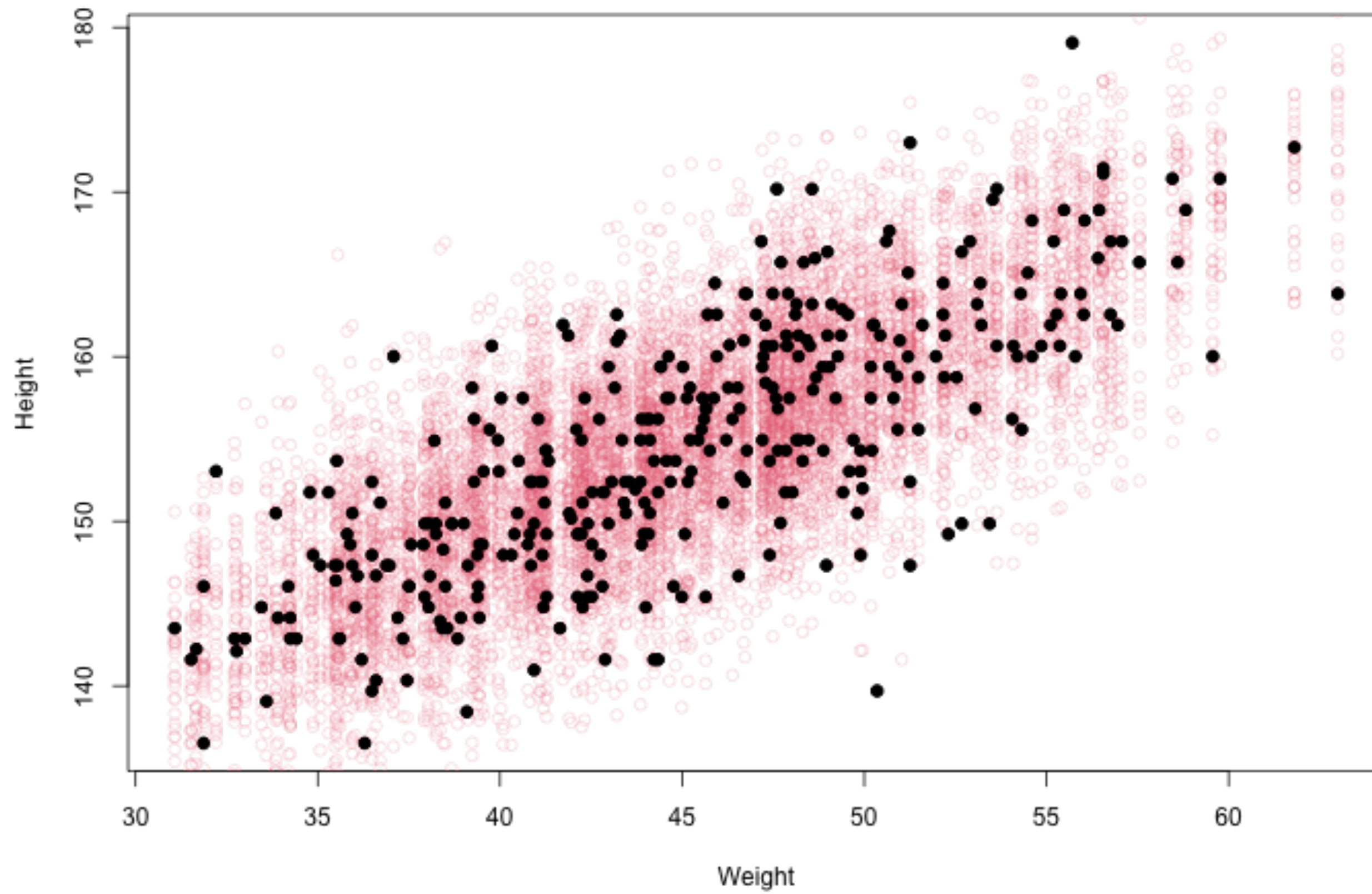
# Step by step for posterior simulations

1. Extract the **posterior samples** for the parameters  $a, b, \sigma$  from the fitted model.
2. For each set of parameter values  $(a_i, b_i, \sigma_i)$ :
  - Compute the predicted outcome:  $y_{pred} = a + bx$ .
  - Add random noise to  $y_{pred}$ , where the noise is drawn from a normal distribution with mean 0 and standard deviation  $\sigma_i$ .

This gives the synthetic data  $y_{sim}$ .
3. Compare the synthetic data  $y_{sim}$  to the observed data  $y$ .
  - Compute summary statistics (e.g., mean, variance, **quantiles**) for both  $y_{sim}$  and  $y$ .
  - If the summary statistics are similar for  $y_{sim}$  and  $y$ , this suggests that the model is a good fit to the data.
4. Repeat steps 2-3 for all sets of parameter values to get a distribution of summary statistics for the synthetic data.
5. Compare the distribution of summary statistics for the synthetic data to the corresponding summary statistics for the observed data. If they are similar, this suggests that the model is a good fit to the data. If they are not similar, this suggests that the model may need to be improved.

# Model Check

Posterior simulations



Pairs plot

