

Today

- Questions from homework?
- Coding an MCMC algorithm
- An example to work on

Rosenbluth algorithm

aka Metropolis-Hastings

Algorithm (original)

for many iterations

 propose new value for parameter:

 draw $\text{Unif}(-\text{max_d}, \text{max_d})$

 proposal = current parameter + draw

 calculate the probability of accepting the proposal:

$P_{\text{accept}} = \min(\text{Pr}(\text{proposal}) / \text{Pr}(\text{current}), 1)$

 accept proposal randomly with $\text{Bern}(P_{\text{accept}})$

plot posterior distribution (histogram) of parameter values

With your
linear data

where $\text{Pr}() = \text{prior} \times \text{likelihood}$

Where are we at?

- Frequentist
 - sampling distribution, SSQ, lm, optim
- Likelihood
 - the likelihood, MLE via optim, likelihood ratios
- Bayesian
 - posterior distribution, prior, MCMC, sampost, ulam, rstanarm
- Simple linear model

Where are we going?

- GLM
 - glm, stan_glm
- GLMM
 - multilevel models, glmer, stan_glmer
- Prediction
 - cross-validation, AIC
 - segue to machine learning

Dataset to analyze

Scientific questions:

How different is species richness between habitats?

How does species richness vary with latitude?

Is this relationship different between habitats?

