Lab 7 Summary

MCMC 1 – Estimating posterior binomial probability

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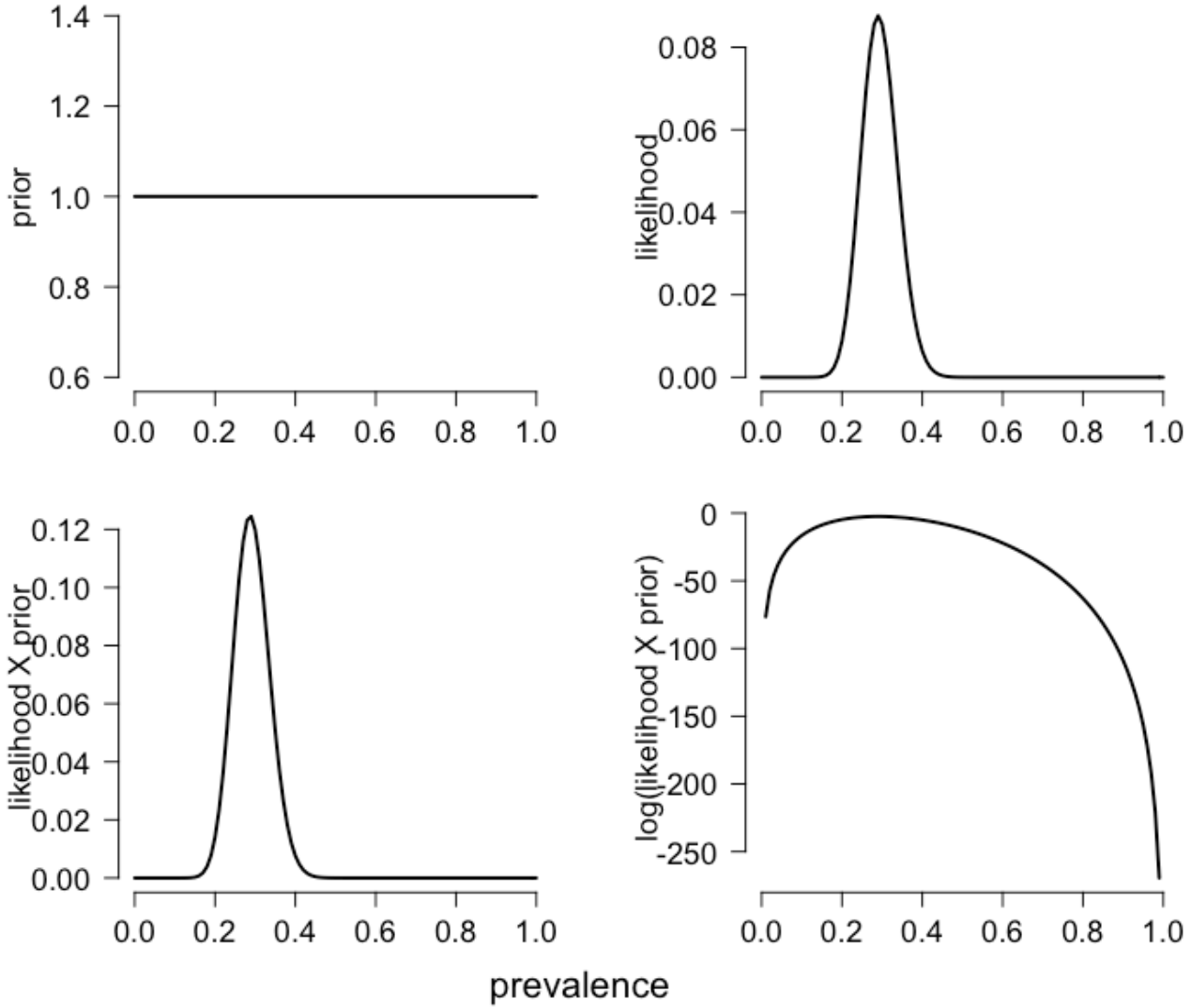
Objectives

- Write a flexible prior function for the binomial
- Understand the Metropolis-Hastings algorithm
- Understand how the parameter proposal distribution affects MCMC convergence
- Know how to assess MCMC convergence

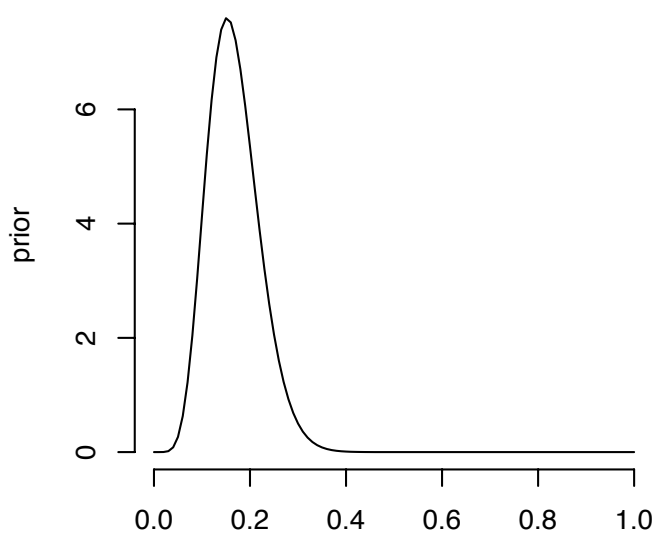
Prior distribution

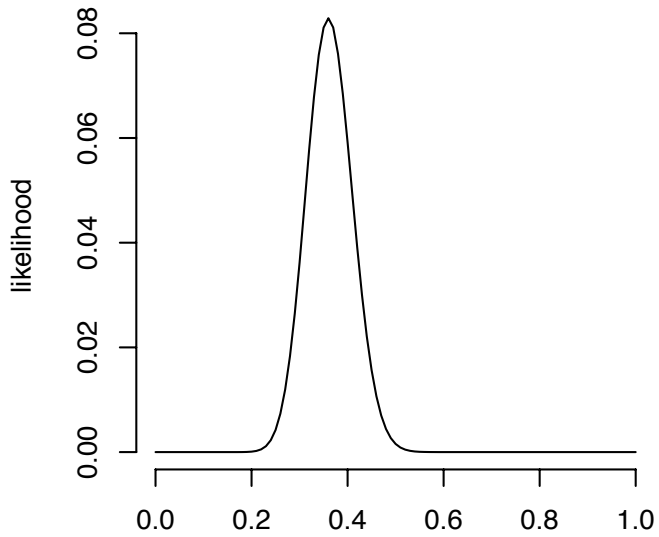
- beta is the most common prior probability distribution for parameters that are probabilities (bounded by 0 and 1)

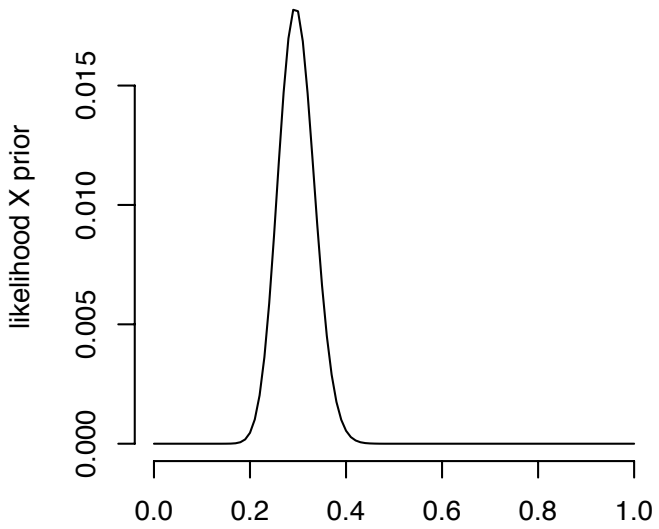
shape1 = 1, shape2 = 1

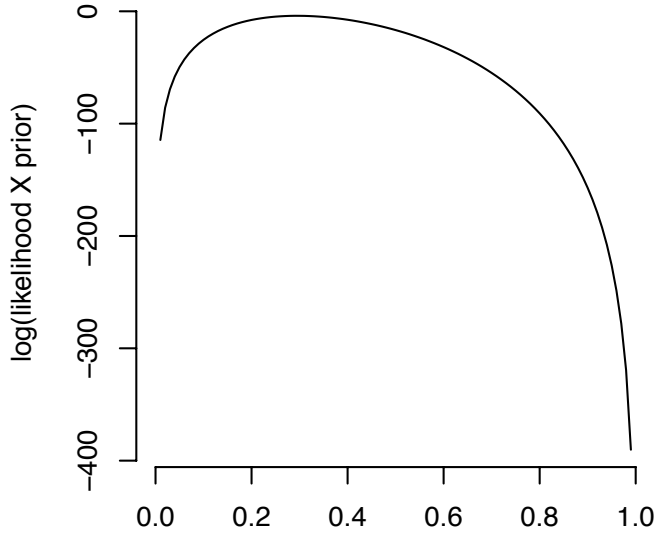


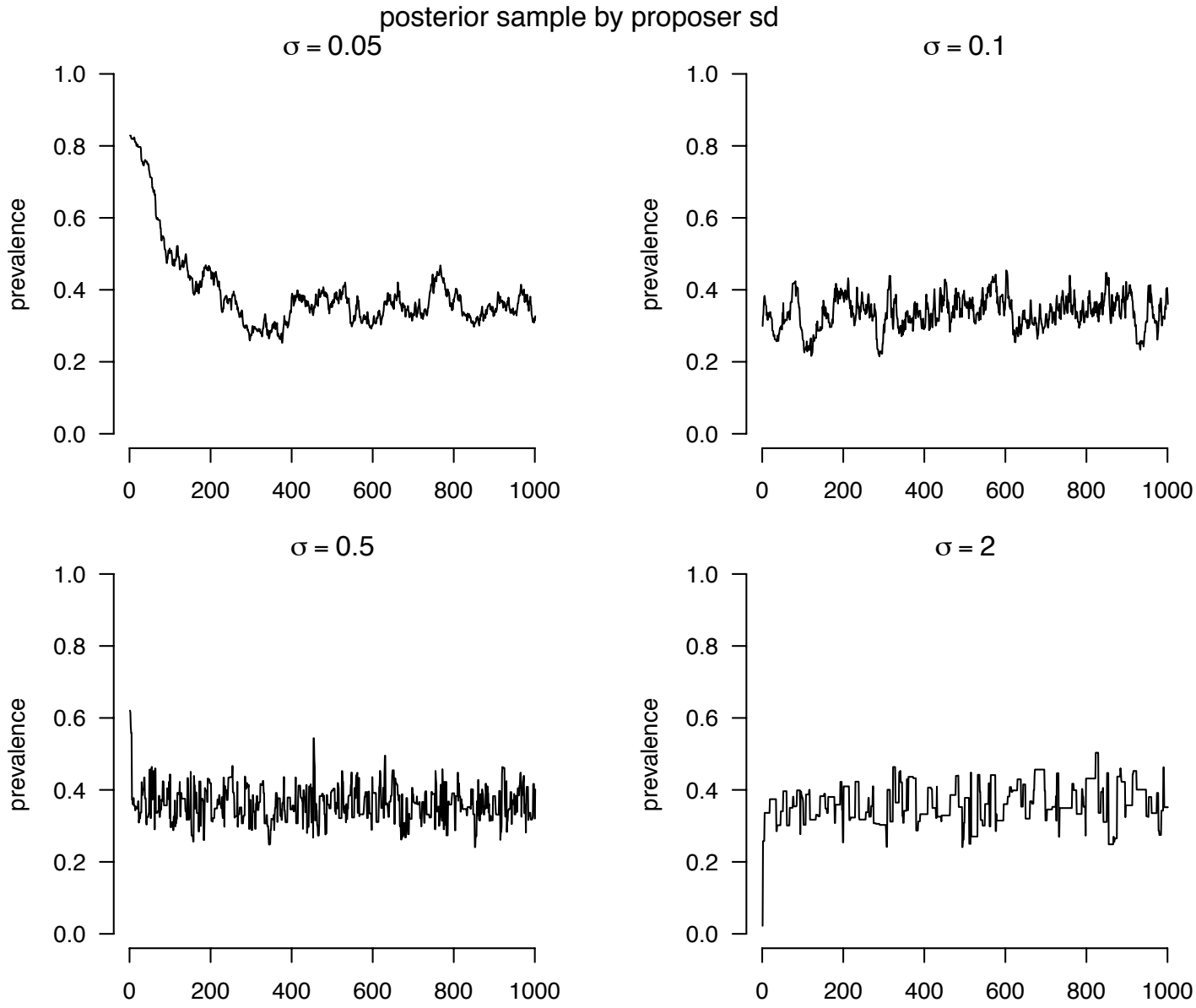
shape1 = 8, shape2 = 40







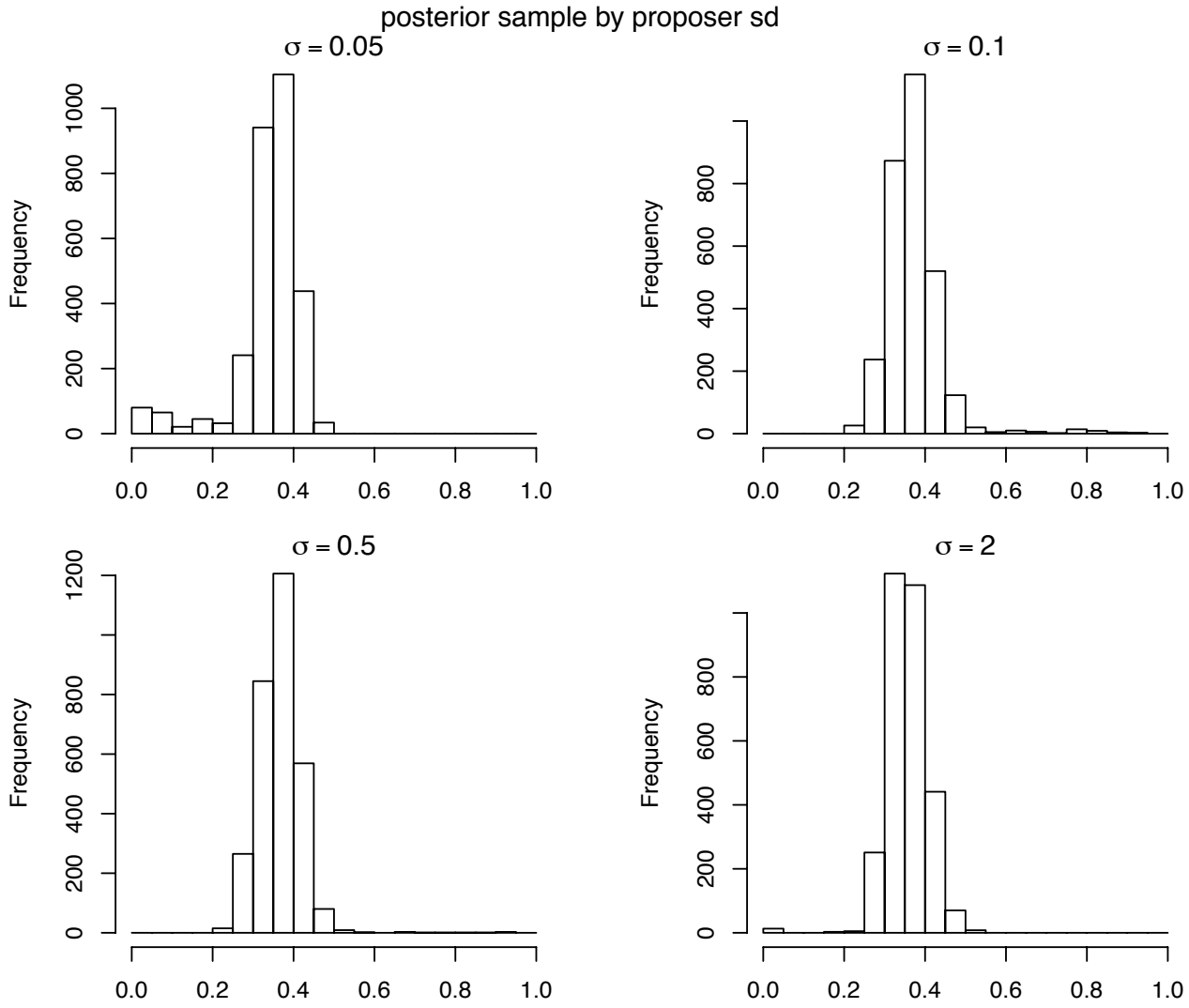



posterior sample by proposer sd
σ = 0.05
σ = 0.1
σ = 0.5
σ = 2
prevalence
1.0
0.8
0.6
0.4
0.2
0.0
0
200
400
600
800
1000

Proposal distribution

- When the standard deviation is set too low, convergence is slow
  - proposals are not different enough
- When too high, trace is “jumpy”
  - proposals are too different, and either get rejected or move the chain far from previous value

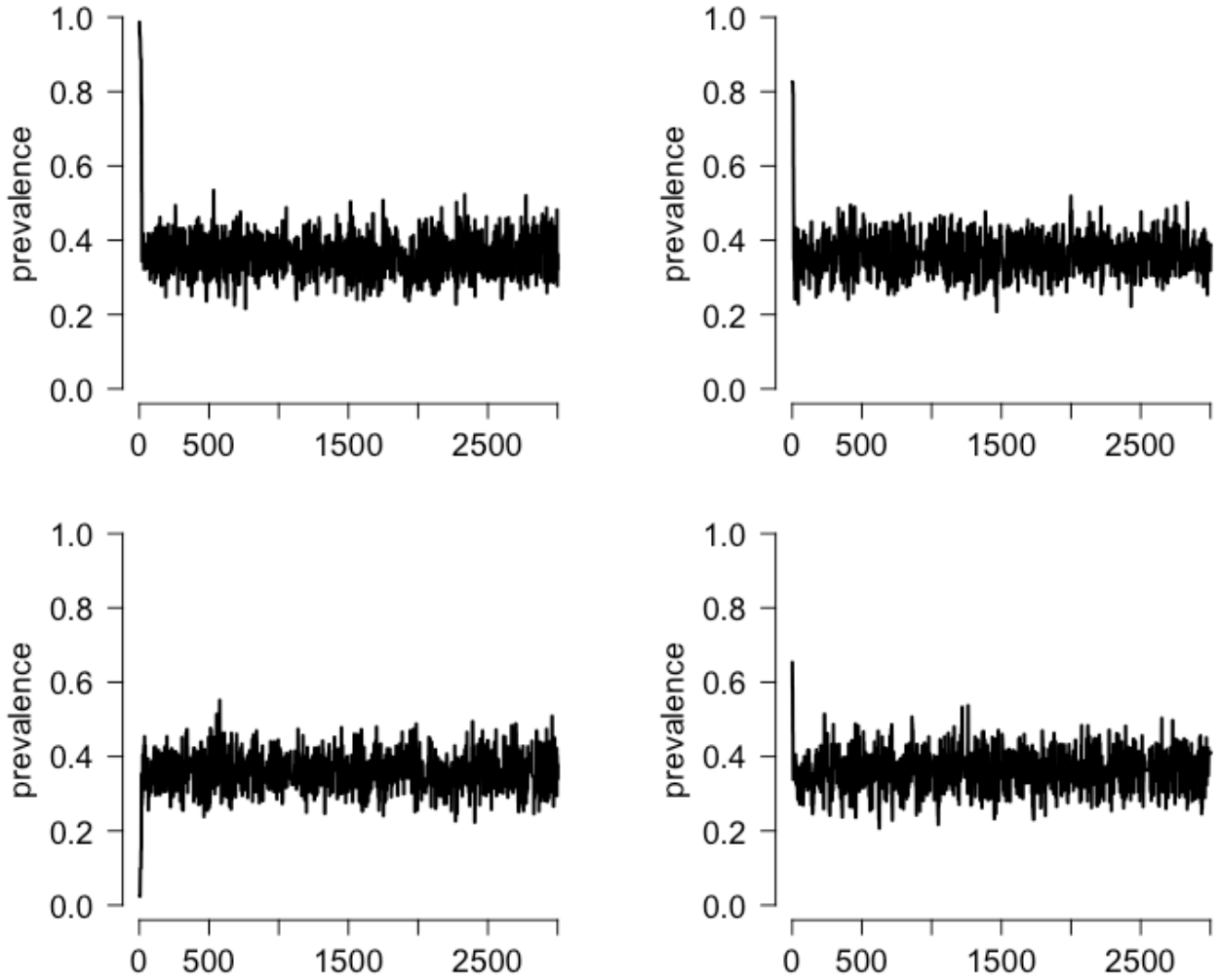
Question 1


posterior sample by proposer sd
σ = 0.05
σ = 0.1
σ = 0.5
σ = 2
Frequency
0
200
400
600
800
1000
1200
0.0
0.2
0.4
0.6
0.8
1.0

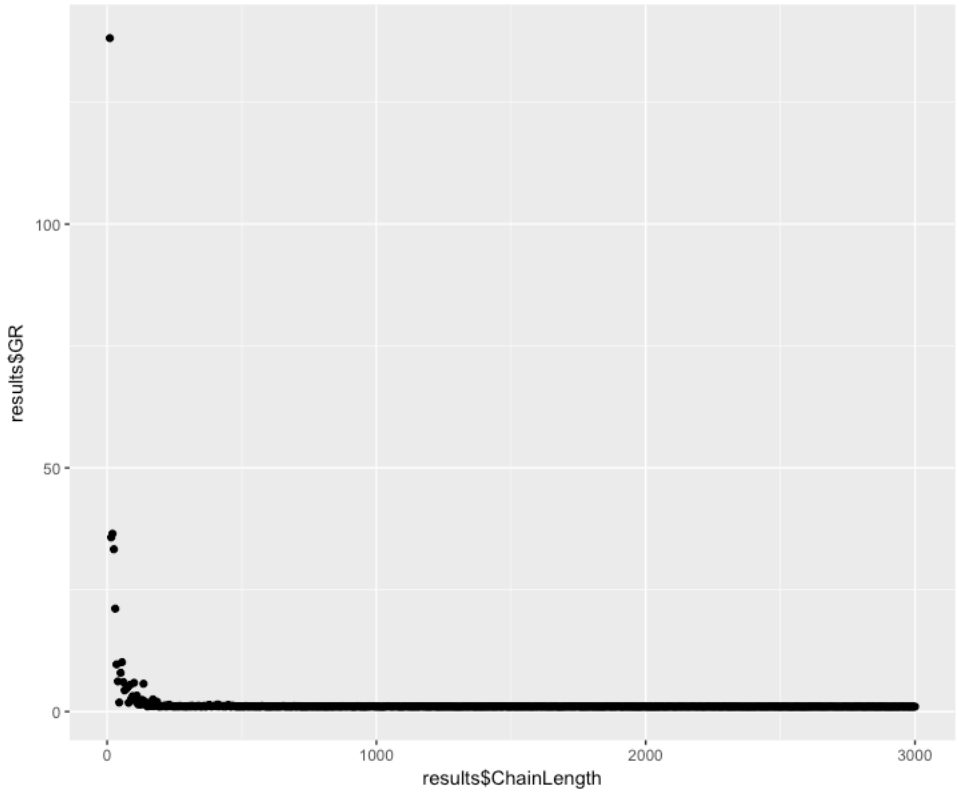
Question 2

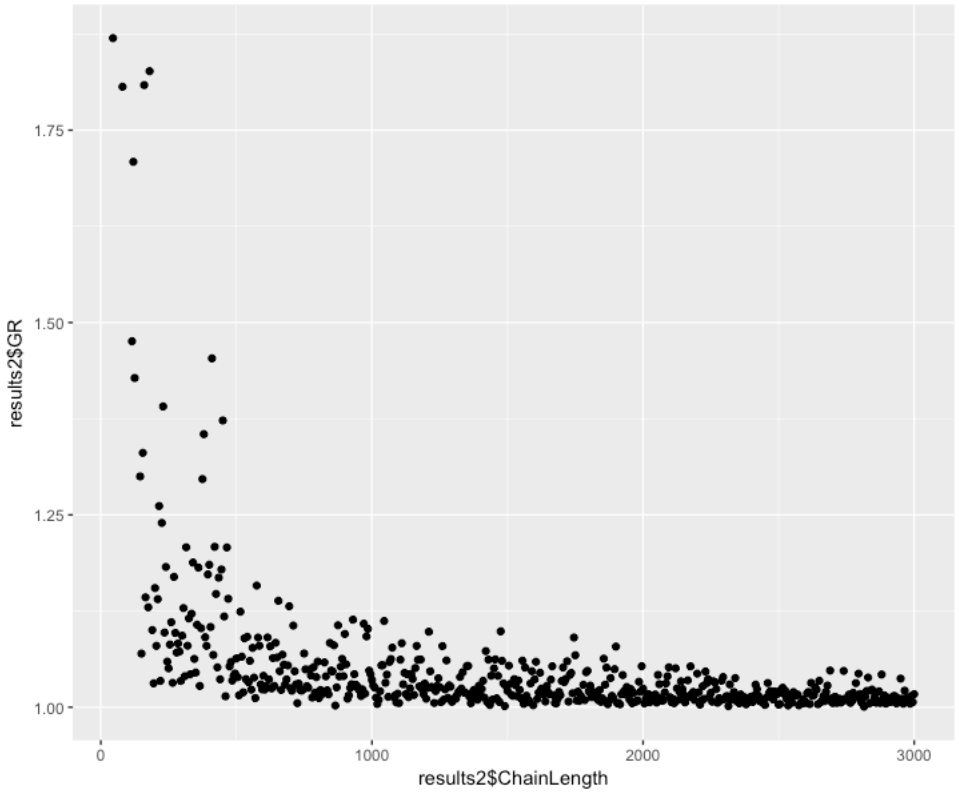
GR ≈1

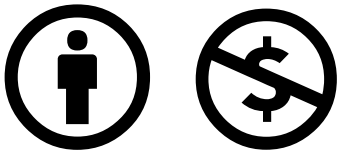
UB: 1.01



Gelman-Rubin diagnostic







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