Solutions Assignment-4

(1) part 1

I have used JAGS for this question

solution is "rmd file.pdf"

Yes, MCMC sampler has converged

and Yes. the rate of discovery is changing over time and it is decreasing.

part 2

Here

Candidate distribution is $N(\beta_j, \sigma_j^2)$

~~N(beta~~

code part is "rmd file.pdf".

Yes, chains have converged.

acceptance ratio for $\alpha = 0.409$

acceptance ratio for $\beta = 0.458$

This ratio is good and acceptable.

(2)

(a), (b), (c), (d), (e) → all answe
I have written in "rmdfile.pdf".

(3).

(a) Convergence may be slow because no. of parameters are more than ~~observat~~ observations
so, it is likely that not all parameters are identifiable.

(b), → JAGS code → "rmdfile.pdf"

(c) Here convergence is better than previous case.
code → "rmdfile.pdf".

(4). For theory I have in "rmdfile.pdf"

The credible set excludes 0
so, we can say that treatment is effective

For the sensitivity to the prior I fit the model using vage but proper priors using JAGs

Here, the results is different as 0 is included in the credible set. So, both mean are same.

priors for $\alpha \sim N(0, 10^2)$

priors for $\beta \sim N(0, 10^2)$

priors for $\sigma^2 \sim$ Inv-Gamma$(0.1, 0.1)$

BLR

Q. 5. $Y_i \sim \beta_0 + \sum_{i=1}^{p} \beta_i X_i + \epsilon_i$, $i = 1, 2 \ldots n$

$\epsilon_i \sim N(0, \sigma^2)$

(a) Uniformative Gaussian prior

$\beta_0 \sim N_0(0, 100^2)$

$\beta_j \overset{iid}{\sim} N(0, 100^2)$, $j = 1 \ldots p$

$\sigma^2 \sim$ Inv-Gamma$(0.01, 0.01)$

MCMC sampler has converged and I have put image of trace plot

(b) ~~Code part~~ I have use the lm function in R and I got β_j , $j = 1 \cdots p$

and I found both regression coeffients same.

(c) Results also same here.

(d) "rmd file.pdf".