STAT 578 - Advanced Bayesian Modeling - Fall 2019
Assignment 2

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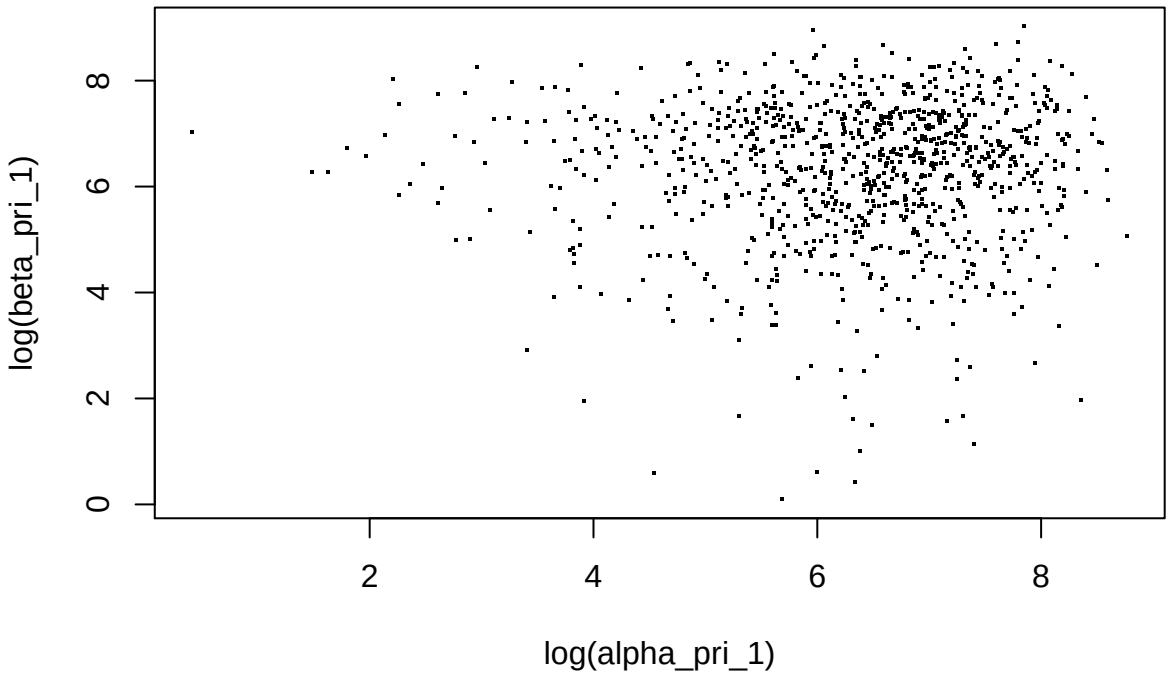
Solution for Problem 1

(a)

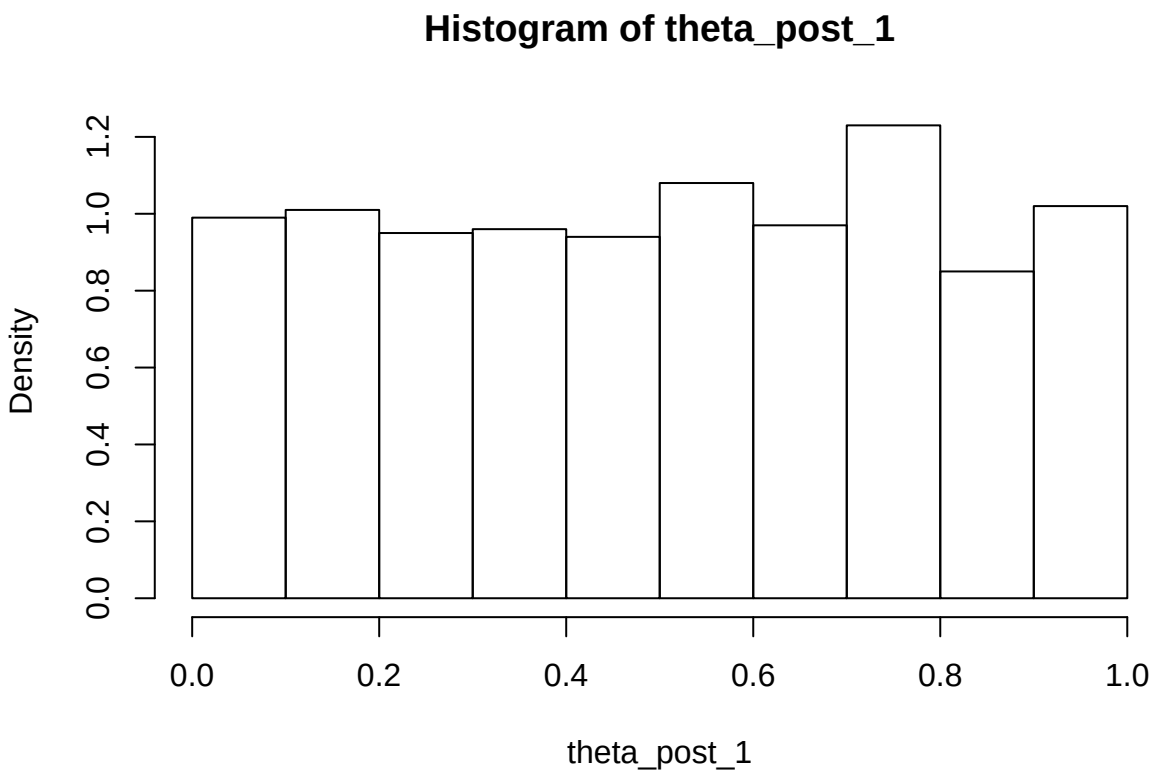
- (i)

```
set.seed(816)
alpha_pri_1 = rexp(1000, rate = 0.001)
beta_pri_1 = rexp(1000, rate = 0.001)
plot(log(alpha_pri_1), log(beta_pri_1), pch=".", cex=2)
```



- (ii)

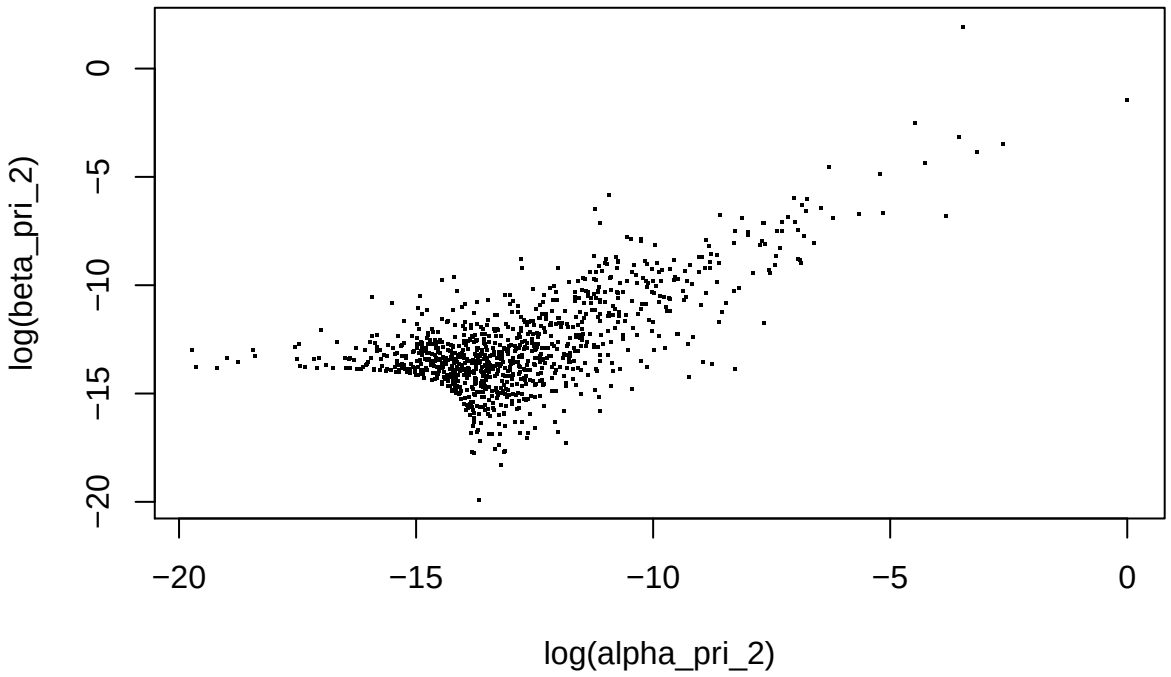
```
theta_post_1 = rbeta(1000, alpha_pri_1, beta_pri_1)
hist(theta_post_1, freq=FALSE)
```



(b)

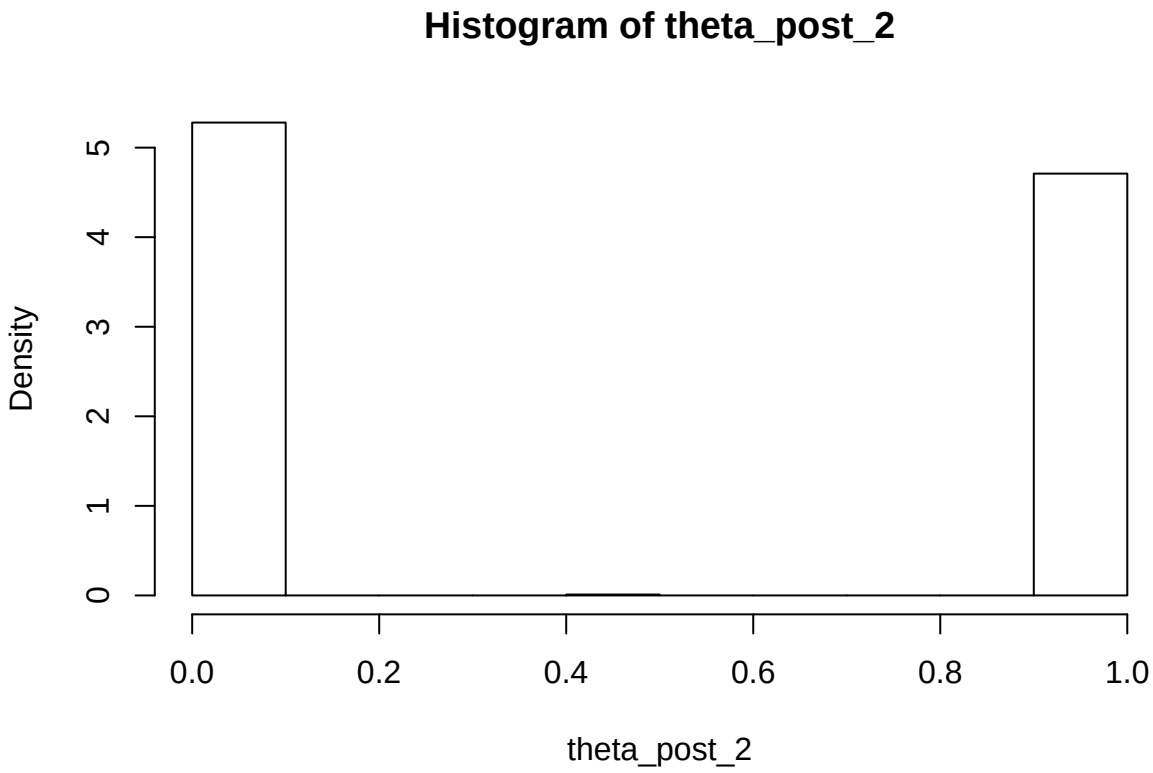
(i)

```
phi_1 = runif(1000, 0, 1)
phi_2 = runif(1000, 0, 1000)
alpha_pri_2 = phi_1 / (phi_2 ^ 2)
beta_pri_2 = (1 - phi_1) / (phi_2 ^ 2)
plot(log(alpha_pri_2), log(beta_pri_2),pch=".", cex=2)
```



(ii)

```
theta_post_2 = rbeta(1000, alpha_pri_2, beta_pri_2)
hist(theta_post_2, freq=FALSE, xlim=c(0,1))
```



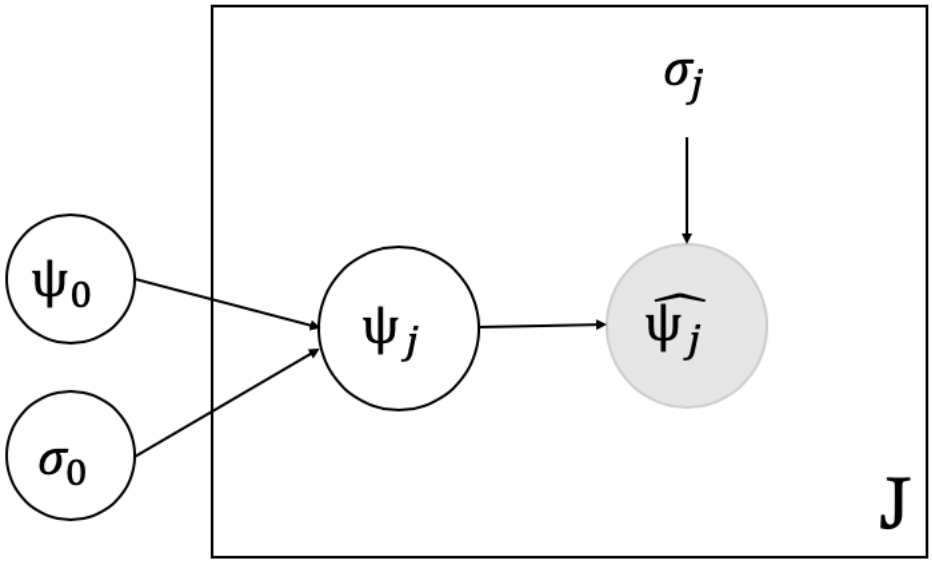


Figure 1: DAG of Model

Solution for Problem 2

(a)

The improper prior densities of hyperpriors are:

$$p(\psi_0) \propto 1, -\infty < \psi_0 < \infty$$

$$p(\sigma_0) \propto 1, \sigma_0 > 0$$

(b)

See Figure.1

(c)

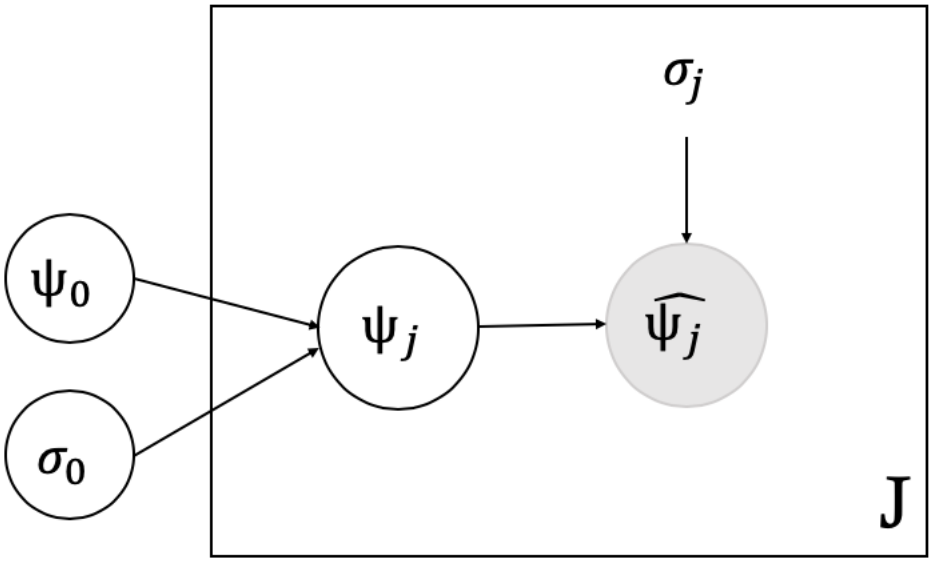


Figure 2: DAG of the Model