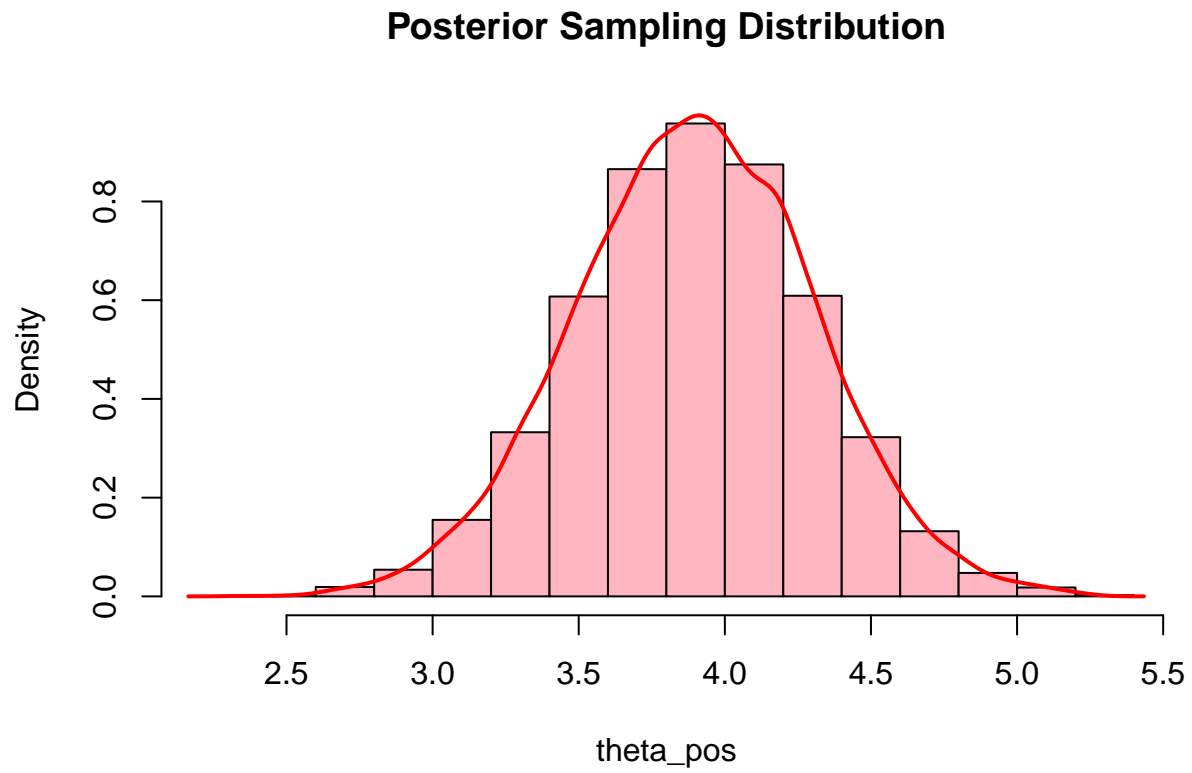


206hw3

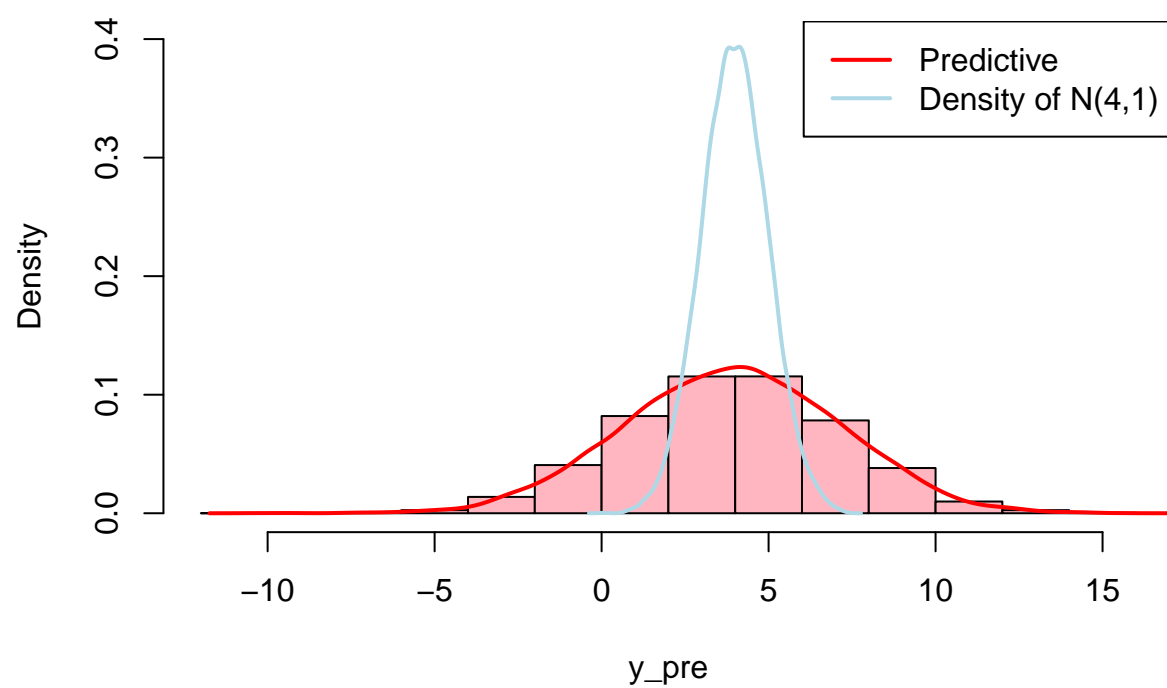
Qi Wang

2022/2/13

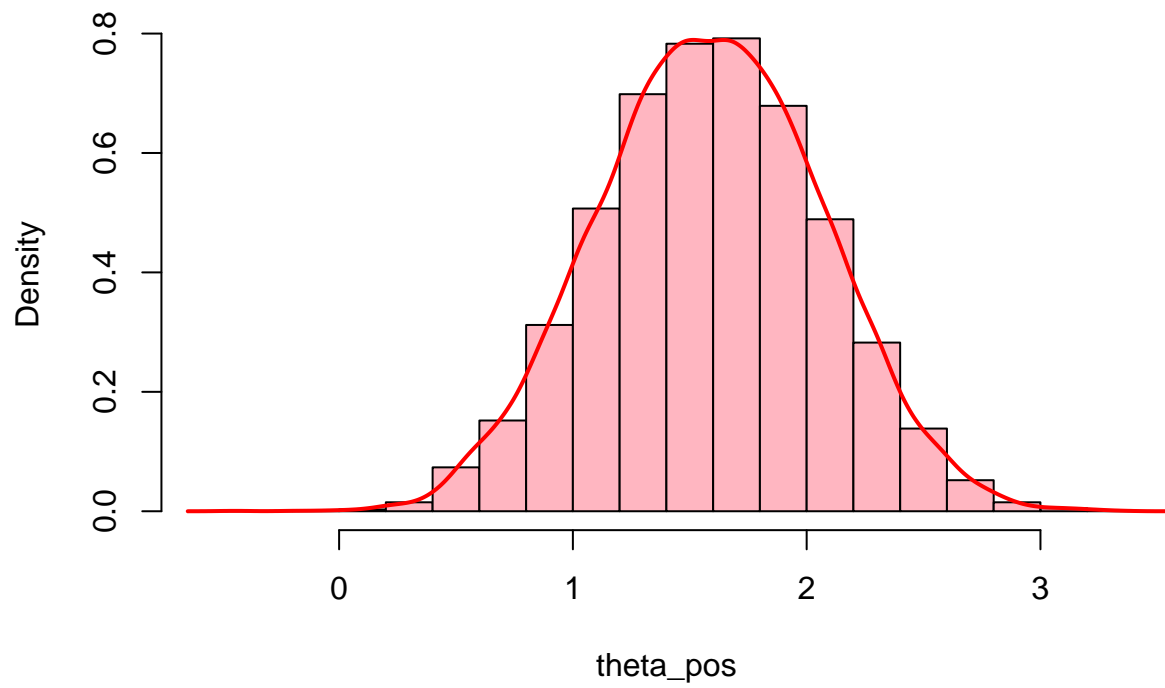
Question 1



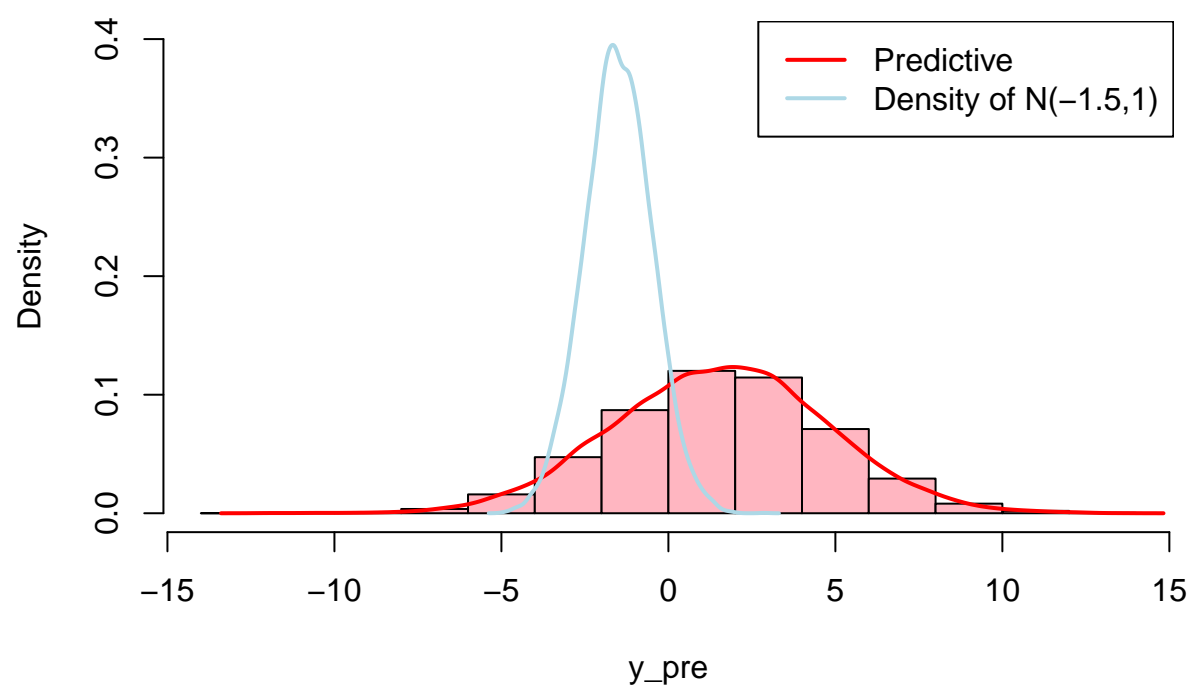
Posterior Predictive Distribution



Posterior Sampling Distribution

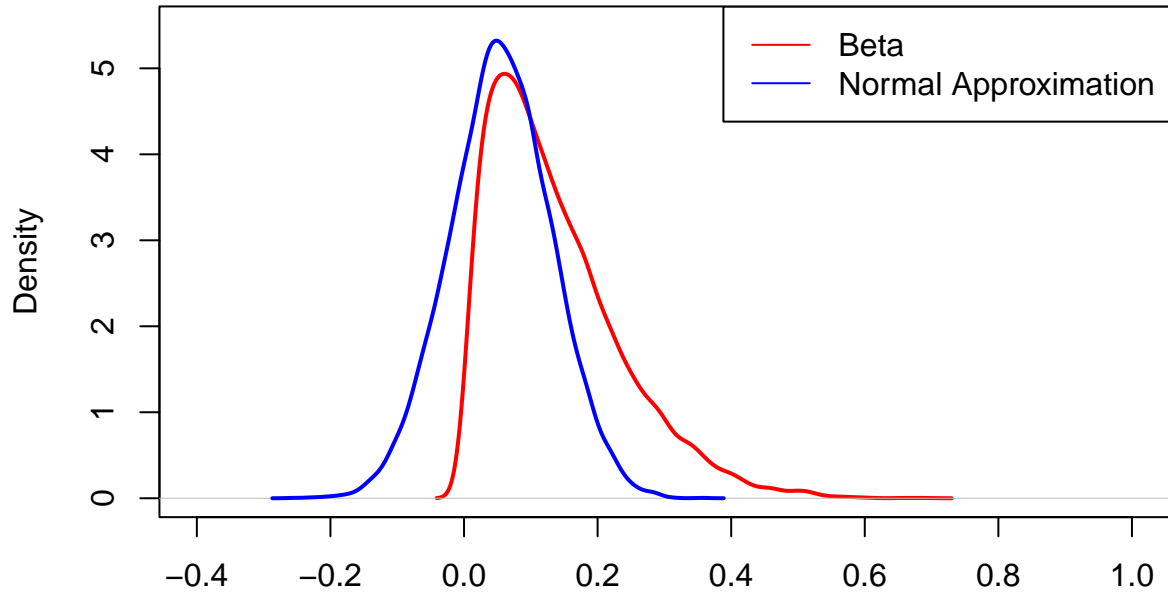


Posterior Predictive Distribution



#Question 7:

Laplace Approximation



N = 10000 Bandwidth = 0.01369

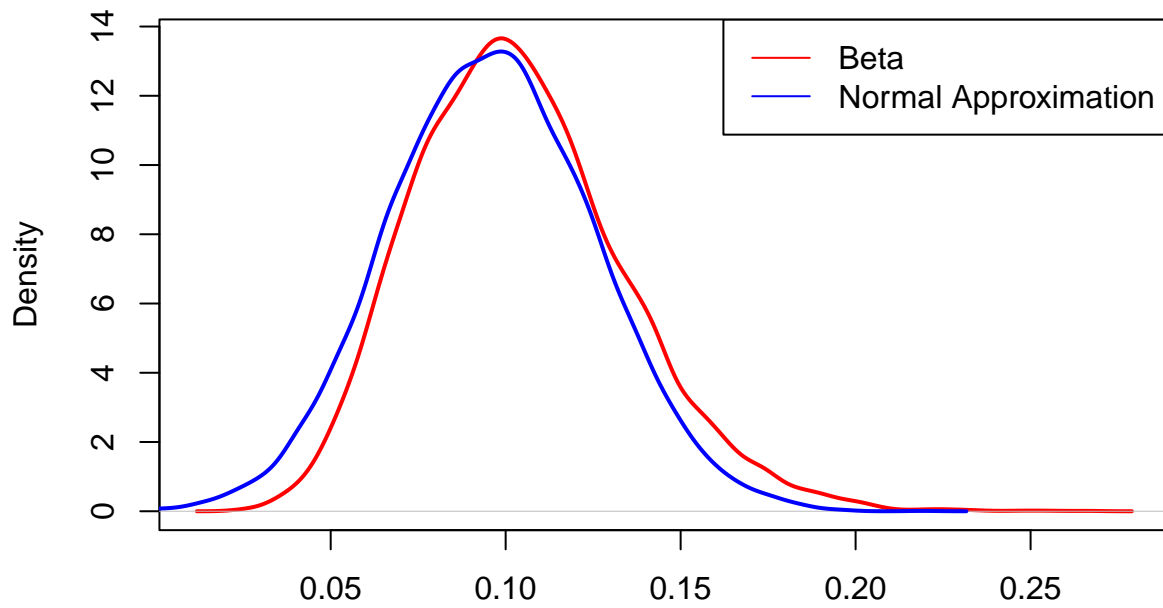
Table 1: N=10, X=1

	2.5% Quantile	97.5 Quantile
True Beta	0.0110117	0.3813148
Laplace	-0.0949521	0.2060632
Monte Carlo	0.0110943	0.3867477

Table 2: N=100, X=10

	2.5% Quantile	97.5 Quantile
True Beta	0.0525847	0.1701239
Laplace	0.0379408	0.1539784
Monte Carlo	0.0527609	0.1711261

Laplace Approximation

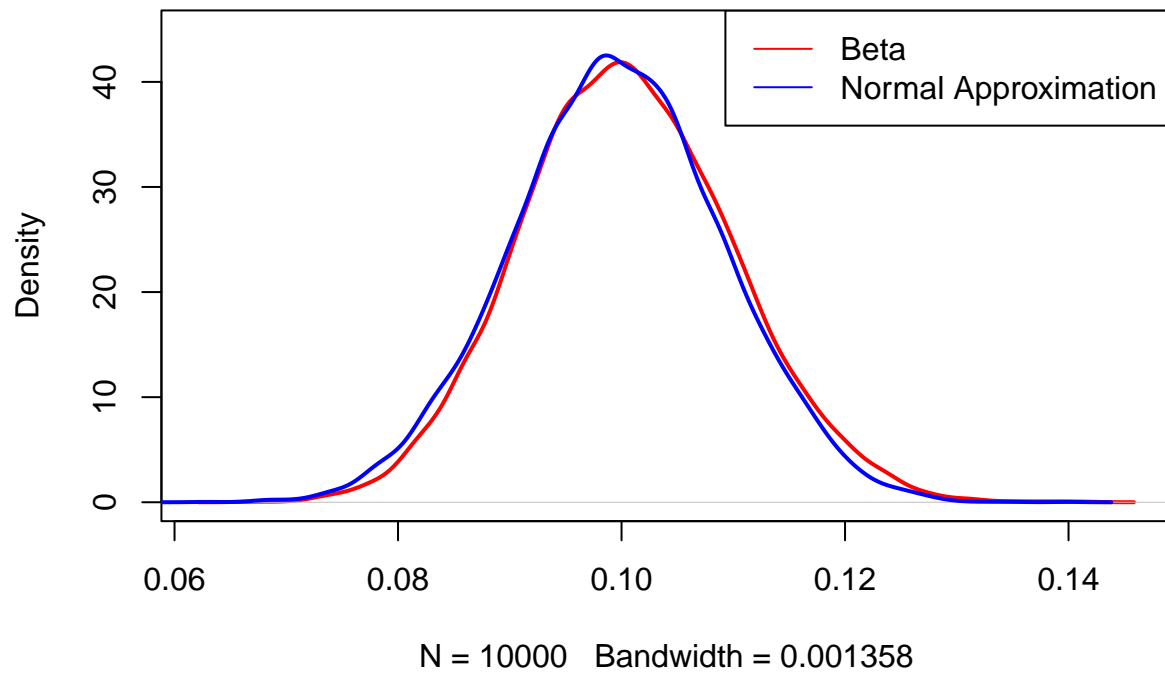


N = 10000 Bandwidth = 0.004255

Table 3: N=100, X=10

	2.5% Quantile	97.5 Quantile
True Beta	0.0825627	0.1197483
Laplace	0.0810296	0.1181696
Monte Carlo	0.0824730	0.1198322

Laplace Approximation

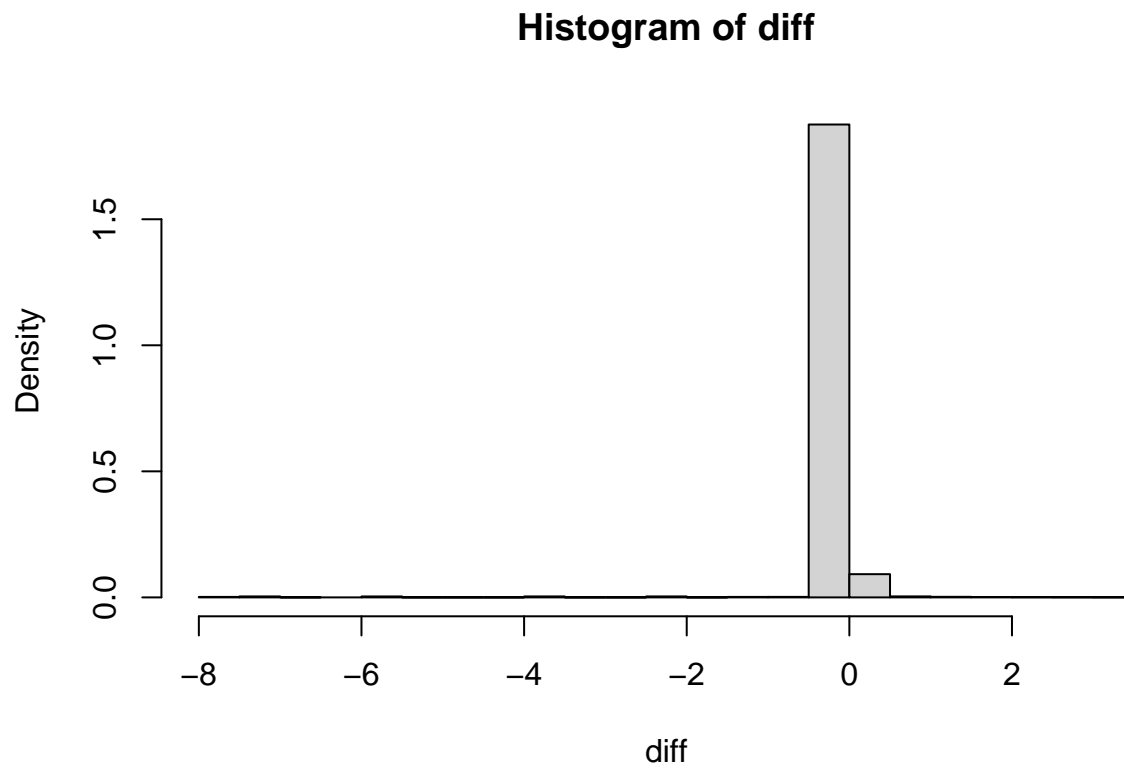


Question 8

```
## Warning: 'cubature' R 4.1.2
```

```
opt <- optim(c(5,5), f)
```

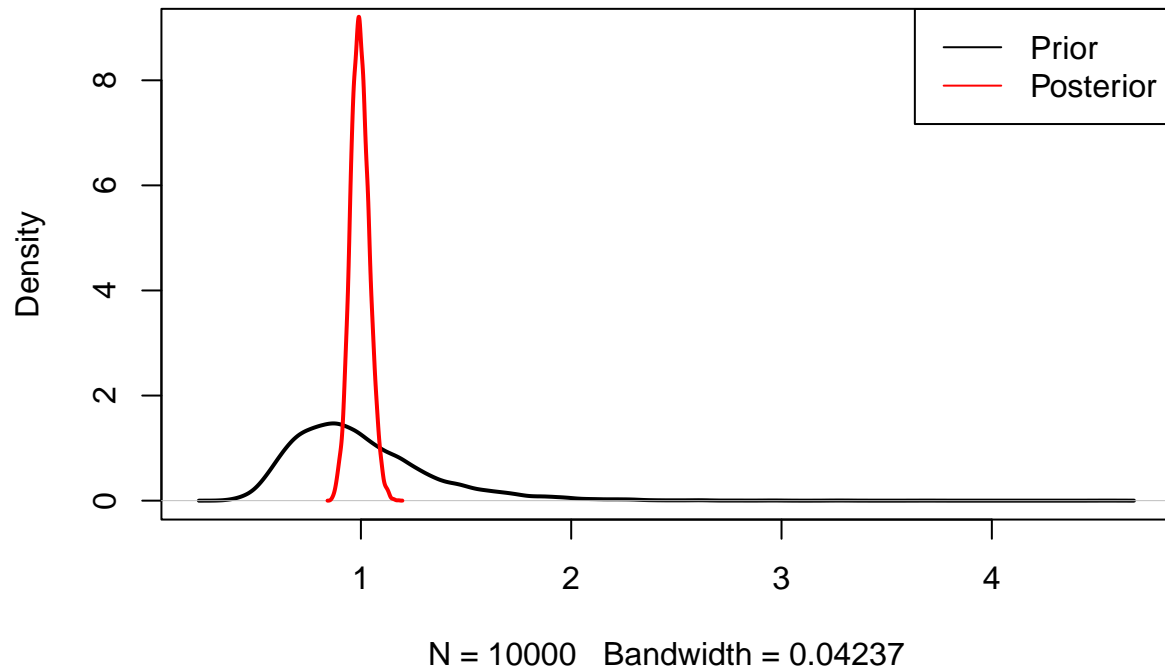
```
para <- opt$par
```



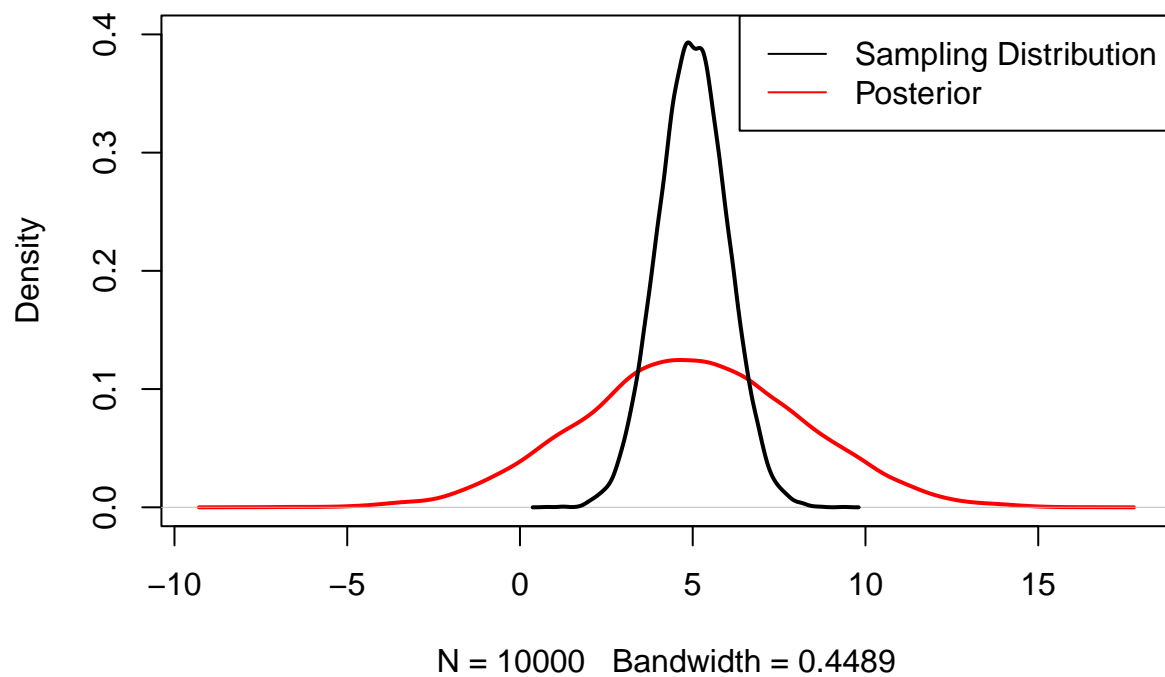
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -7.75824  0.00000  0.00000 -0.03802  0.00000  3.39968
```


Question 9

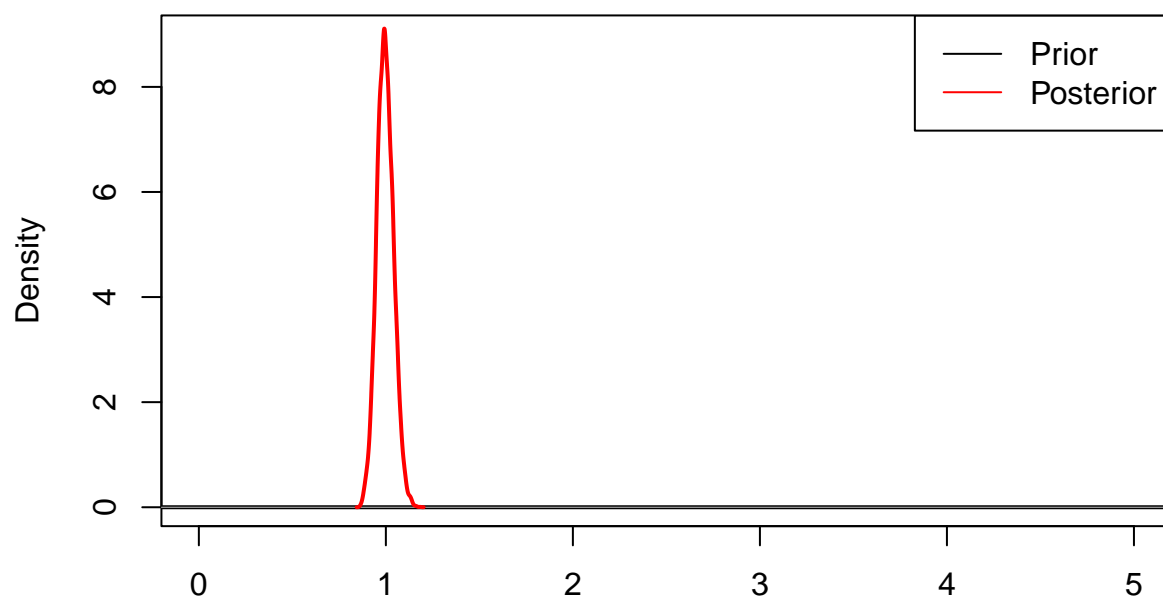
Marginal Distribution for Sigma^2



Marginal Posterior Distribution of Theta

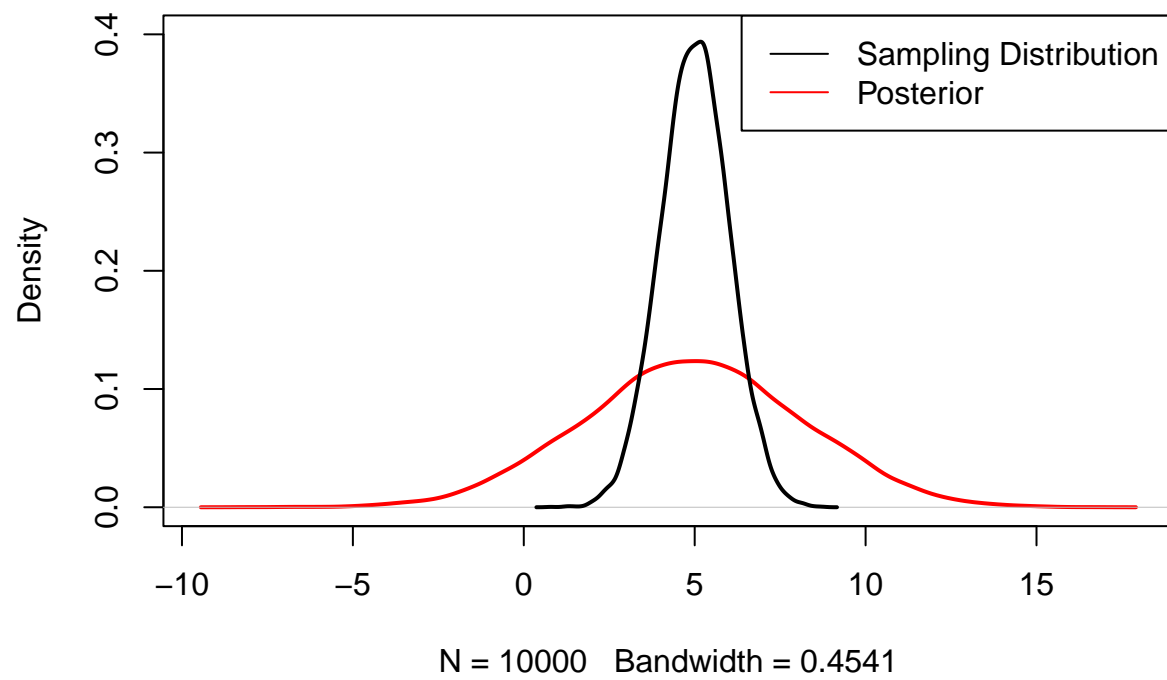


Marginal Distribution for Sigma^2

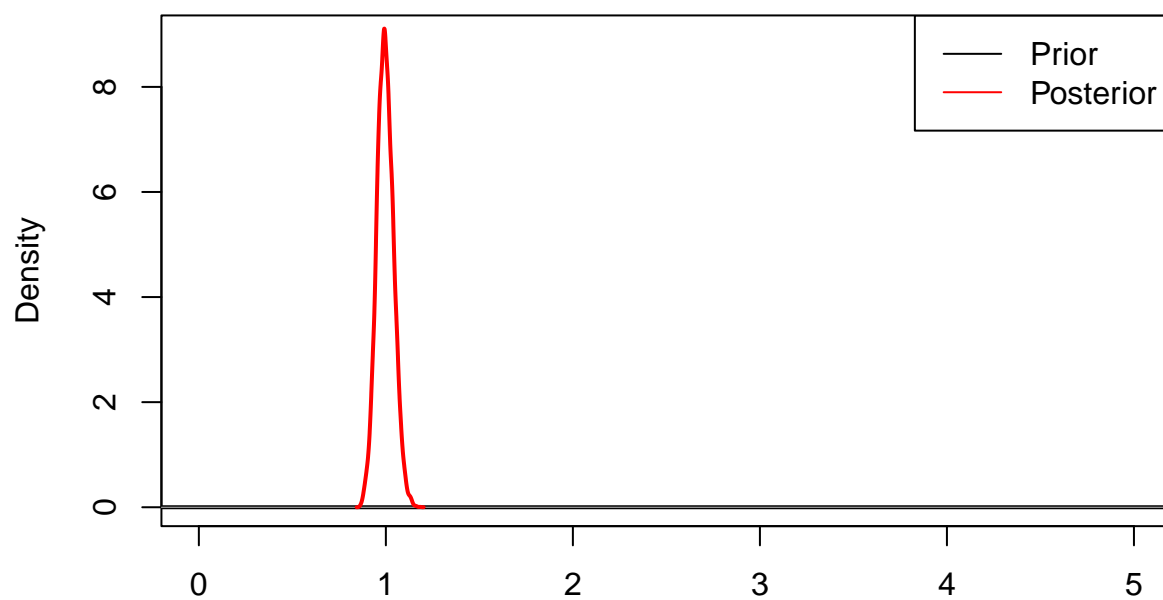


N = 10000 Bandwidth = 1.575e+04

Marginal Posterior Distribution of Theta

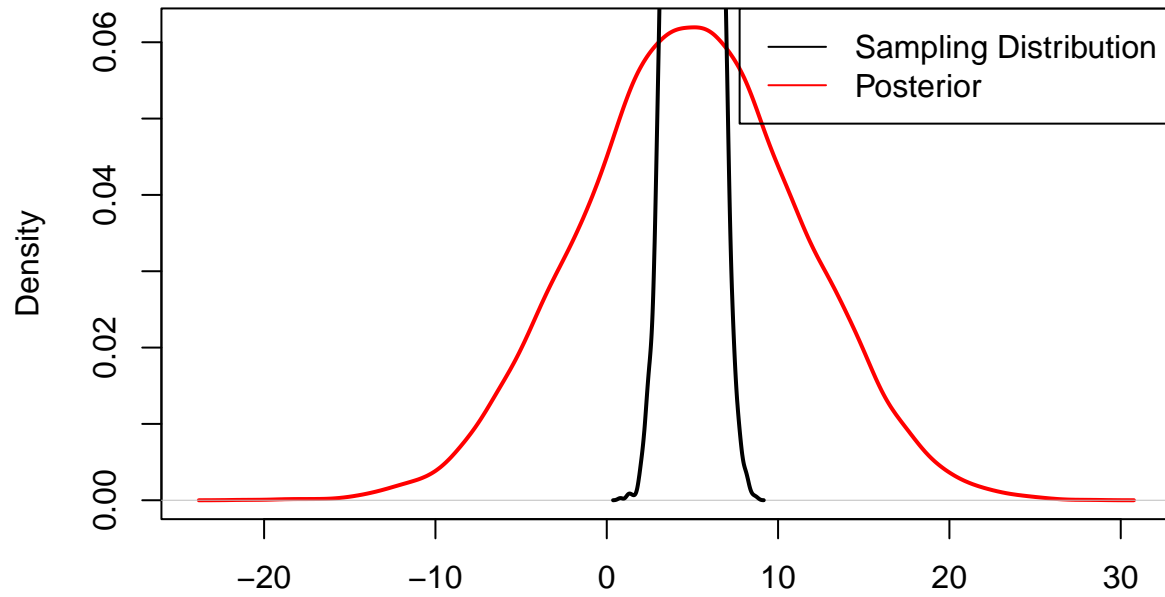


Marginal Distribution for Sigma²



N = 10000 Bandwidth = 1.575e+04

Marginal Posterior Distribution of Theta



N = 10000 Bandwidth = 0.9059

Table 4: Ratio of Mean to SD for 4 Cases

	2.5% Quantile	97.5% Quantile
Case 1	4.789701	5.208691
Case 2	4.768147	5.227301
Case 3	4.789512	5.208661
Case 4	4.767879	5.227299