Lab 1 - TDDE07

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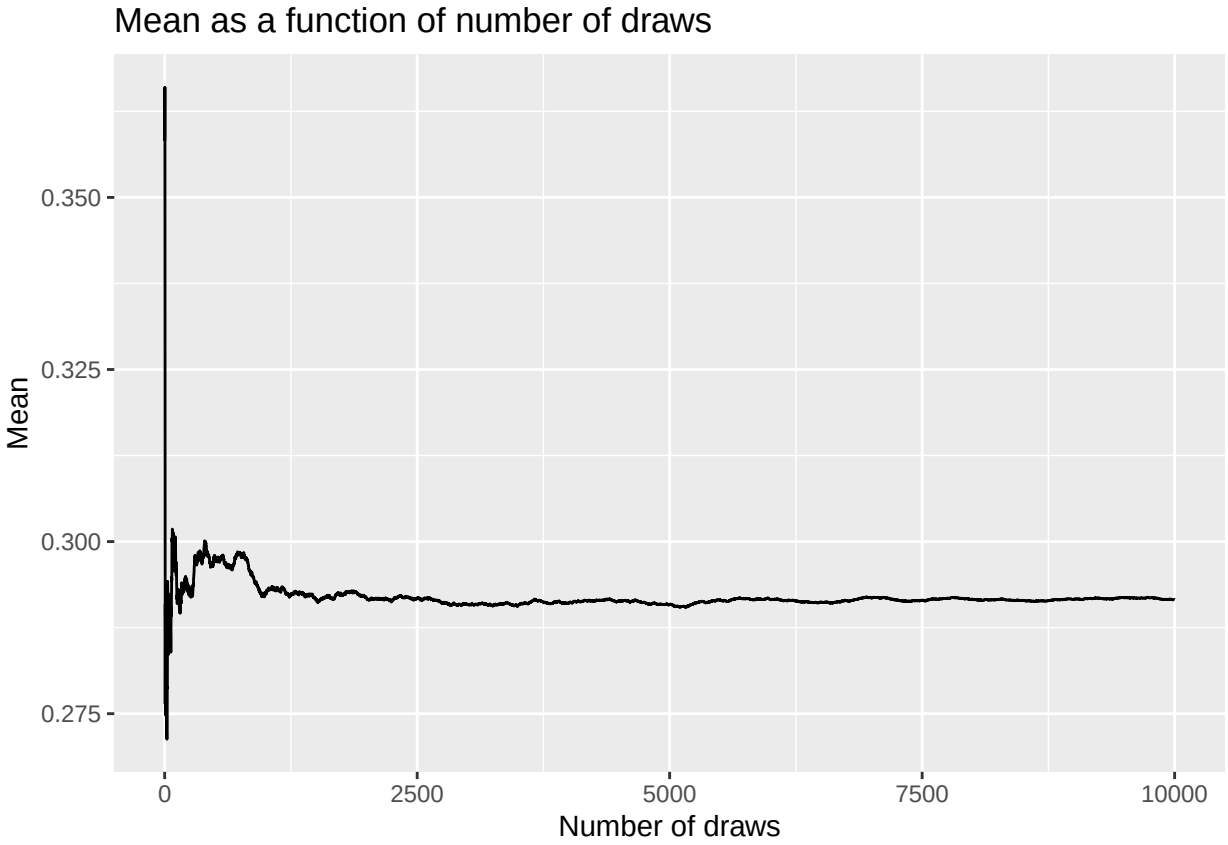
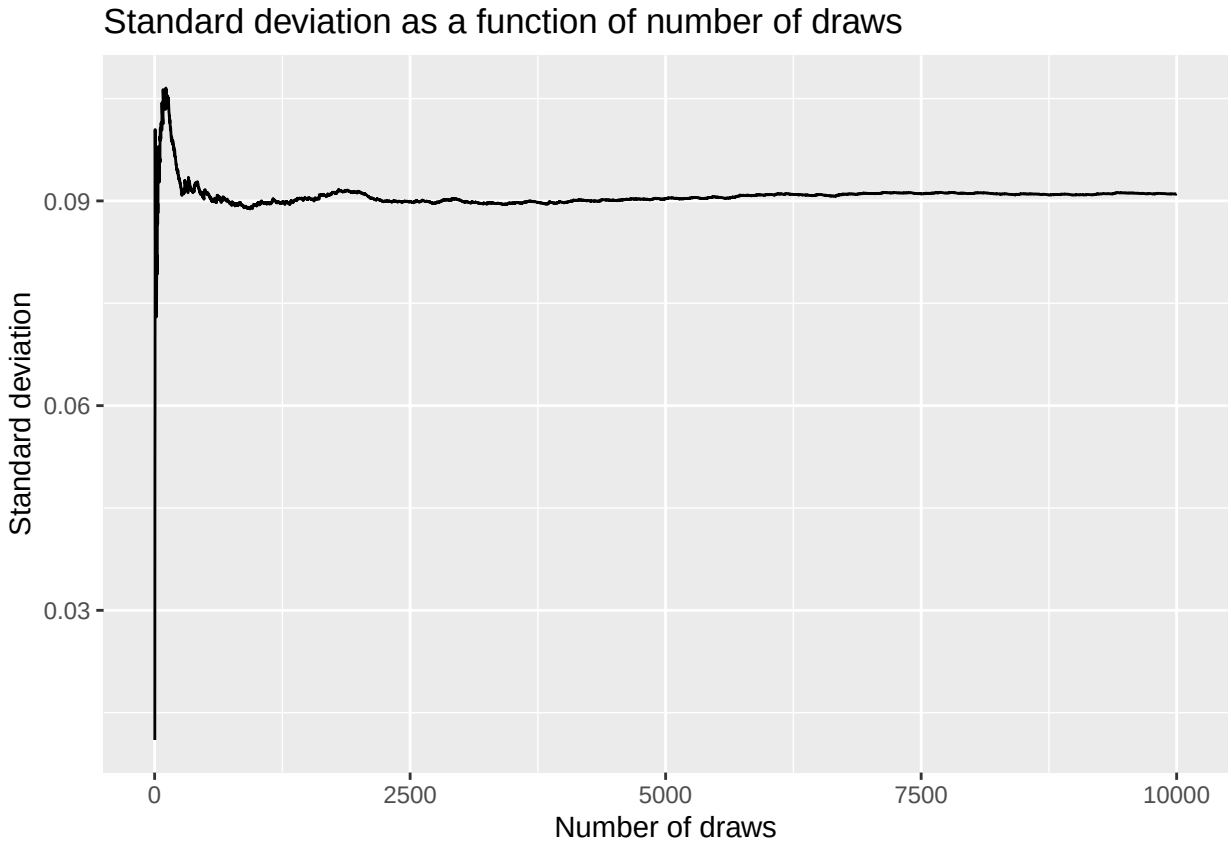
1.

a)



Above is a graph that shows the mean as a function of the number of draws. As one can see it converges to about 0.292. To calculate the true value for the mean of the posterior the following values are used $\alpha = \alpha_o + s = 2 + 5$ and $\beta = \beta_0 + f = 2 + 15$ and the formula to calculate the mean of a beta distribution is $E(\theta|y) = \alpha/(\alpha + \beta)$ where $\theta|y \sim Beta(a_0 + s, b_0 + f) = Beta(7, 17)$. The true value of the mean is 0.2917.



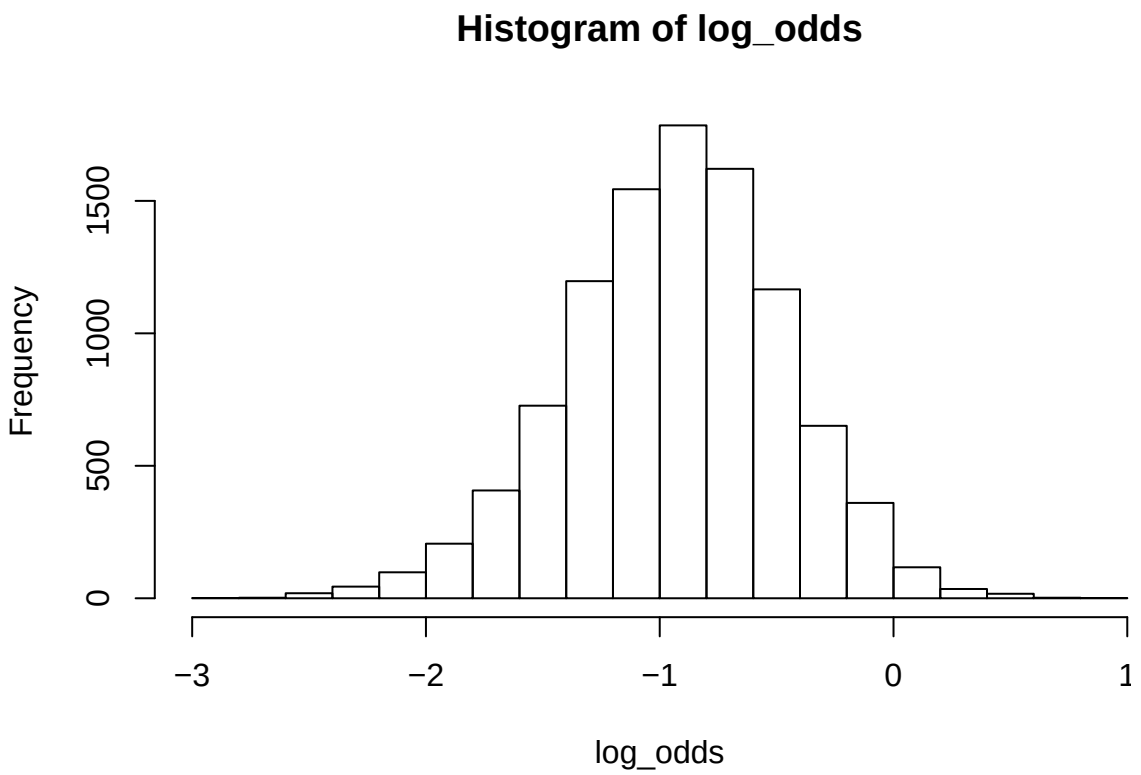
Above is a graph that shows the standard deviation as a function of the number of draws. As one can see it converges to about 0.091. To calculate the true value for the standard deviation of the posterior the following values are used $\alpha = \alpha_o + s = 2 + 5$ and $\beta = \beta_0 + f = 2 + 15$ and the formula to calculate the standard deviation of a beta distribution is $SD(\theta|y) = \sqrt{V(\theta|y)} = \sqrt{\alpha\beta/((\alpha+\beta)^2(\alpha+\beta+1))}$ where $\theta|y \sim Beta(a_0 + s, b_0 + f) = Beta(7, 17)$. The true value of the standard deviation is 0.0901.

b)

```
##      1
## 0.4392
```

The true value of the probability is 0.4399472 and the the calculated probability is 0.4392. They are almost equal.

c)

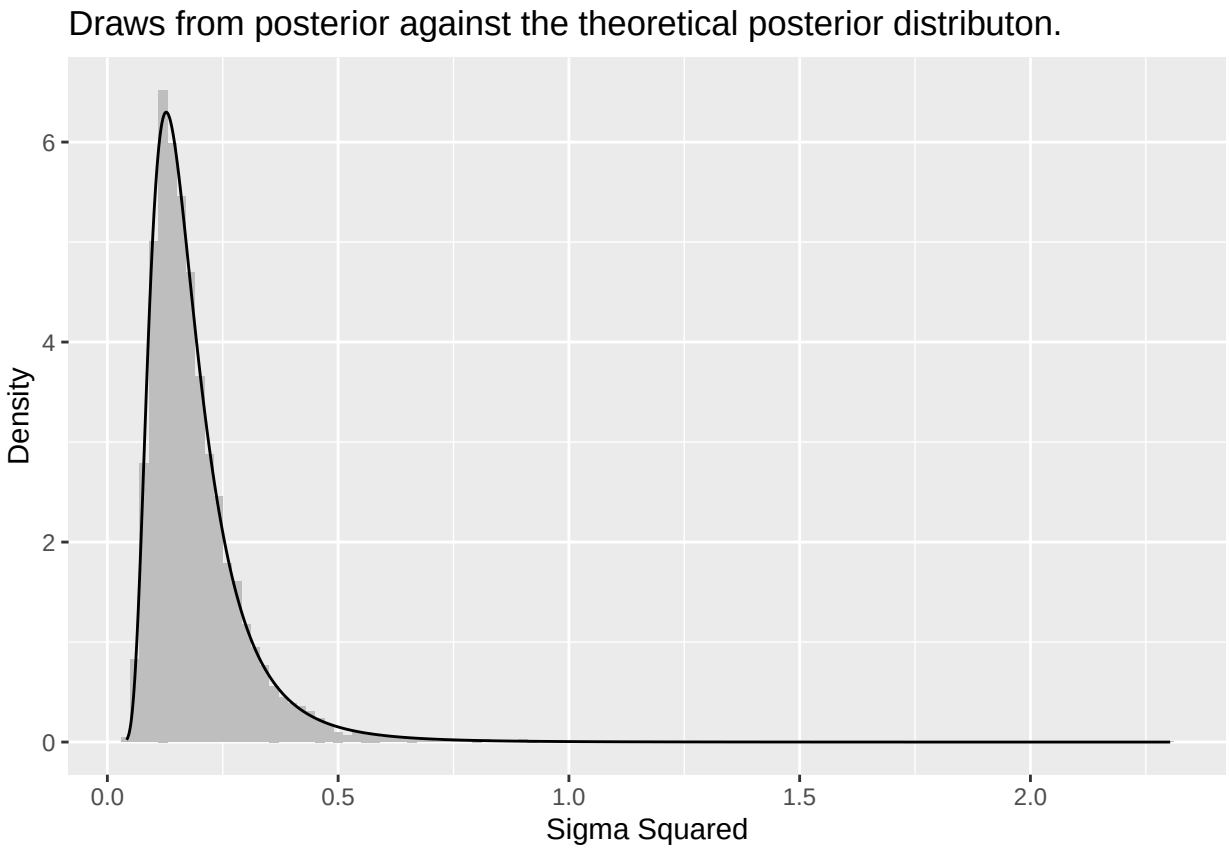


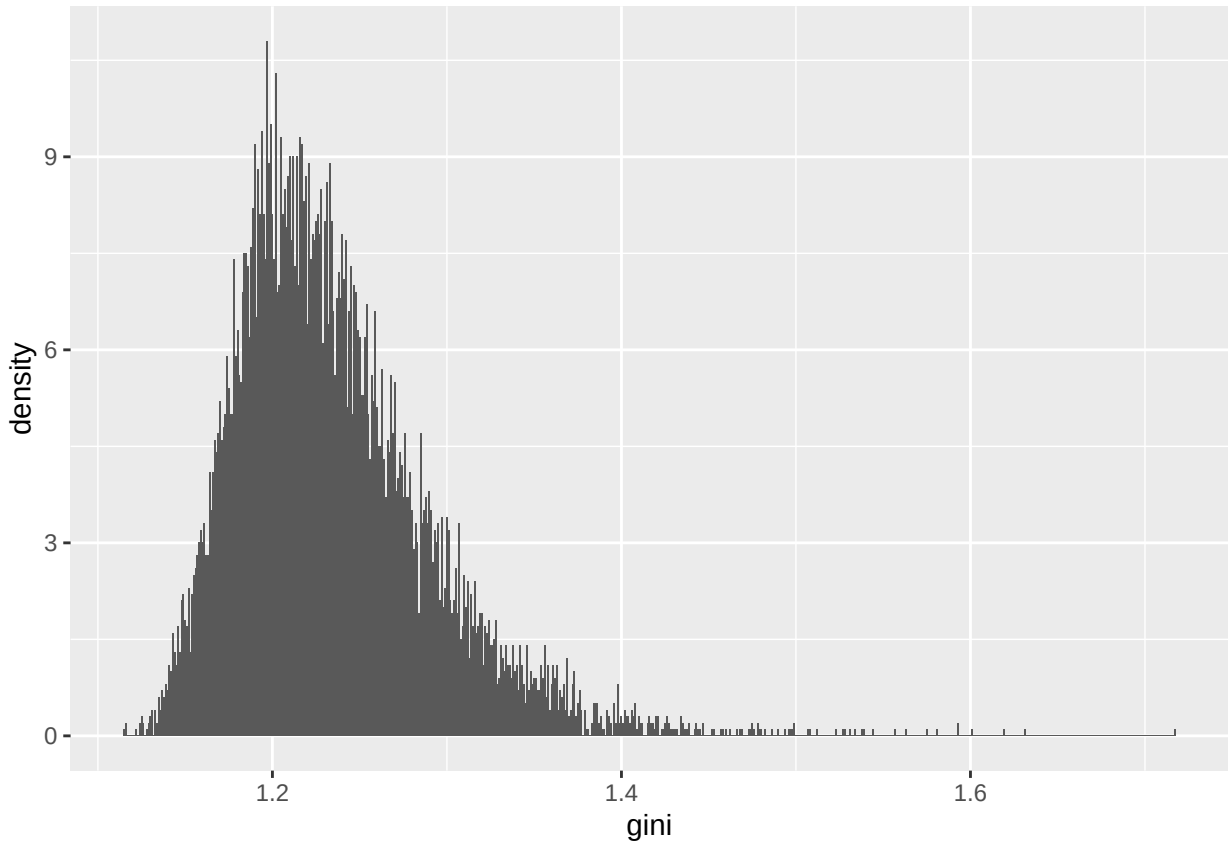

```
##
## Call:
##  density.default(x = log_odds)
##
## Data: log_odds (10000 obs.); Bandwidth 'bw' = 0.06469
##
##        x                 y
##  Min.   :-3.17277   Min.   :0.0000071
##  1st Qu.:-2.08423   1st Qu.:0.0027689
##  Median :-0.99569   Median :0.0560336
##  Mean   :-0.99569   Mean   :0.2294409
##  3rd Qu.: 0.09285   3rd Qu.:0.4063222
##  Max.   : 1.18139   Max.   :0.8987902
```

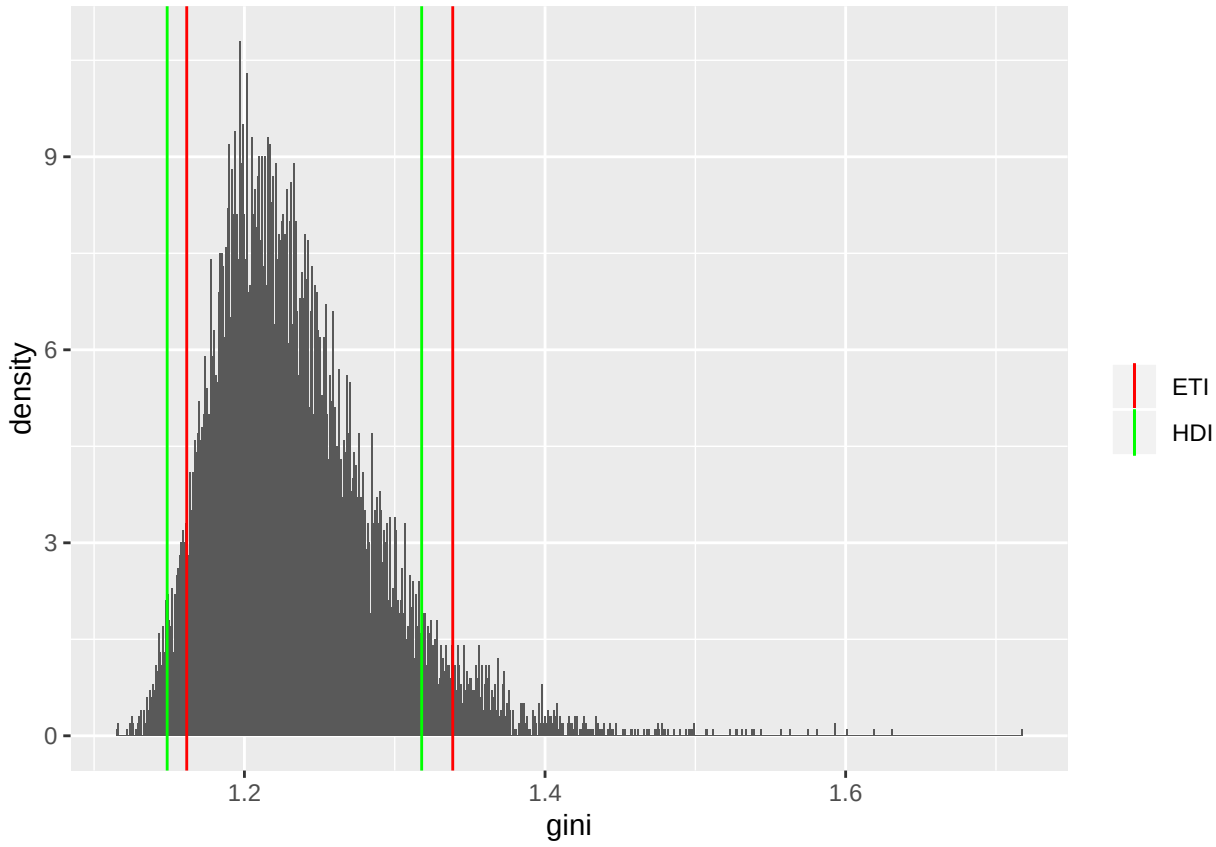
Above is a histogram of the log-odds. The log-odds seems to be normally distributed with a mean of about -1.

2.

a)


Draws from posterior against the theoretical posterior distributon.
Density
0
2
4
6
0.0
0.5
1.0
1.5
2.0
Sigma Squared


density
9
6
3
0
1.2
1.4
1.6
gini


density
9
6
3
0
1.2
1.4
1.6
gini
ETI
HDI