STATISTICAL RETHINKING WINTER 2024 HOMEWORK, WEEK 1

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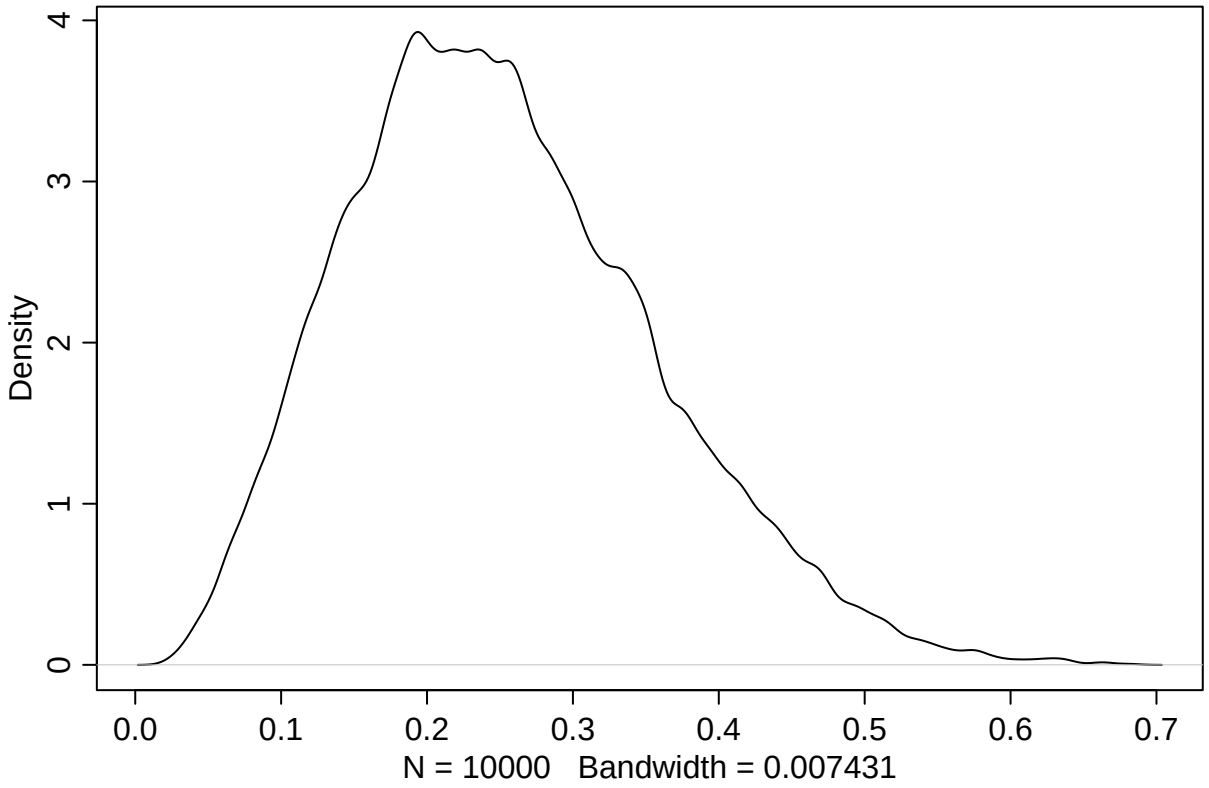
Problem 1

Suppose the globe tossing data (Lecture 2, Chapter 2) had turned out to be 3 water and 11 land. Construct the posterior distribution.

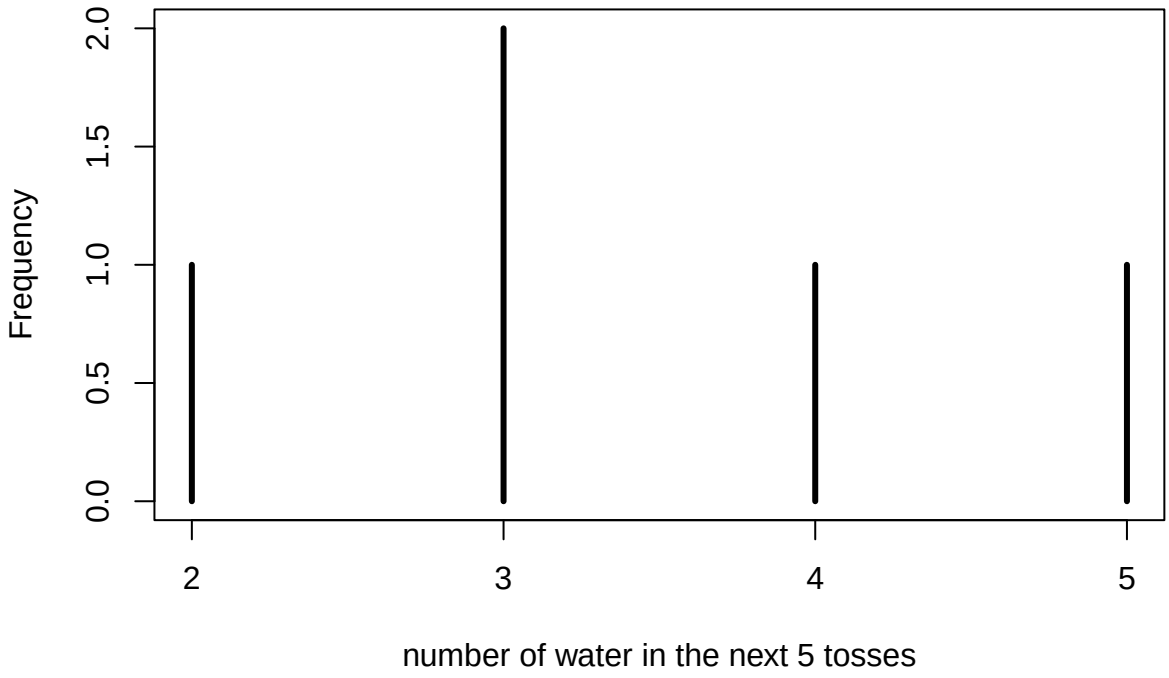
```
n_water <- 3
n_land <- 11
n <- n_water + n_land

## define grid
p_grid <- seq(from = 0, to = 1, length.out = 500)

# define prior
prior <- rep(1,500)

# compute likelihood at each value in grid
likelihood <- dbinom(n_water, size = n , prob = p_grid)

# compute product of likelihood and prior
unstd.posterior <- likelihood * prior

# standardize the posterior
posterior <- unstd.posterior / sum(unstd.posterior)

# sampling method
samples <- sample(p_grid, prob = posterior, size = 1e4, replace = T)

# plot
dens(samples)
```



Problem 2

Using the posterior distribution from 1, compute the posterior predictive distribution for the next 5 tosses of the same globe. I recommend you use the sampling method.

```
# number of water in the next 5 tosses
set.seed(111)
w <- rbinom(5, size = n, prob = samples)
simplehist(w, xlab = 'number of water in the next 5 tosses')
```


Frequency
0.0
0.5
1.0
1.5
2.0
2
3
4
5
number of water in the next 5 tosses