Statistical Rethinking Homework

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Week 1

Question 1. Suppose the globe tossing data (Chapter 2) had turned out to be 4 water and 11 land. Construct the posterior distribution, using grid approximation. Use the same flat prior as in the book.

```r
p_grid <- seq(from = 0, to = 1,length.out = 1000)
prior <- rep(1,1000)
prob_data <- dbinom(4, 15, prob = p_grid)

posterior <- prob_data * prior
posterior <- posterior/sum(posterior)

set.seed(100)

samples <- sample(p_grid, prob = posterior, size = 1e4, replace = TRUE)
```
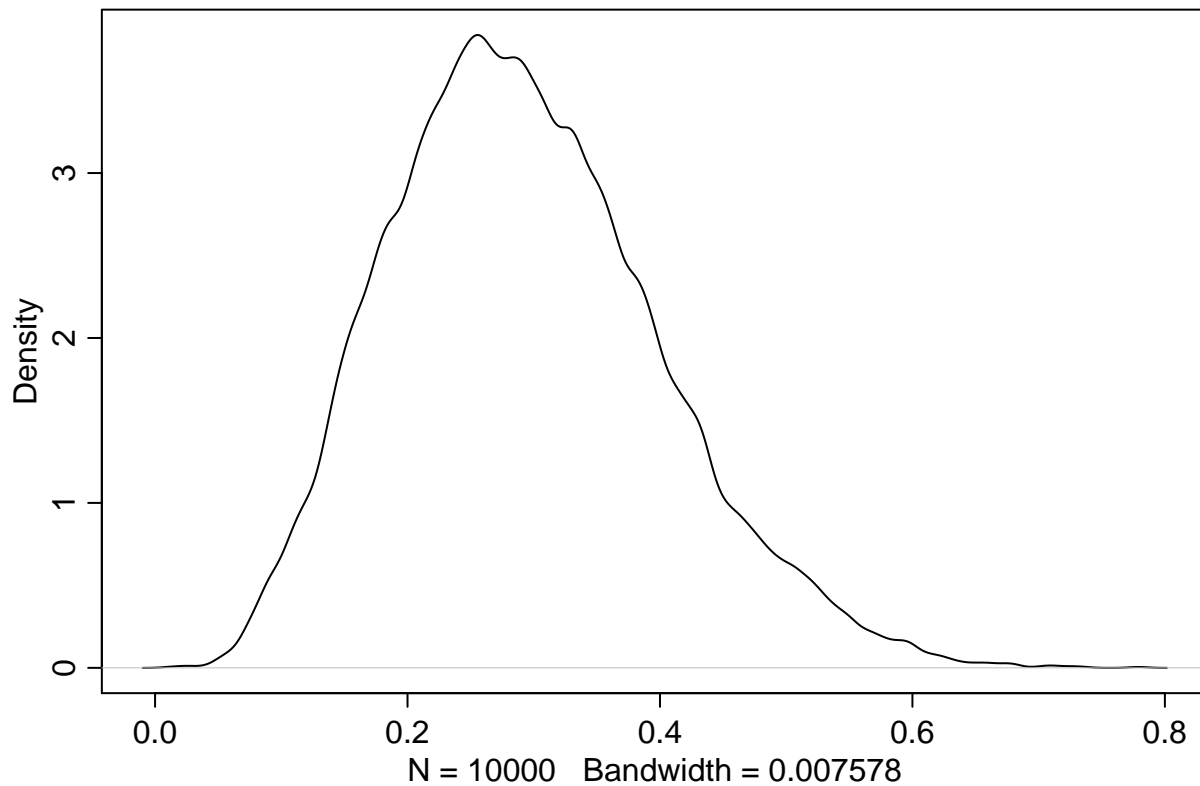
Question 2. Now suppose the data are 4 water and 2 land. Compute the posterior again, but this time use a prior that is zero below p = 0.5 and a constant above p =0.5. This corresponds to prior information that a majority of the Earth's surface is water.

```r
prior2 <- ifelse( p_grid < 0.5, 0, 1)
p_likelihood <- dbinom(4, 6, prob = p_grid)

posterior2 <- p_likelihood * prior2
posterior2 <- posterior2/sum(posterior2)

set.seed(100)

samples2 <- sample(p_grid, posterior2, size = 1e4, replace = TRUE)
```

N = 10000   Bandwidth = 0.007937
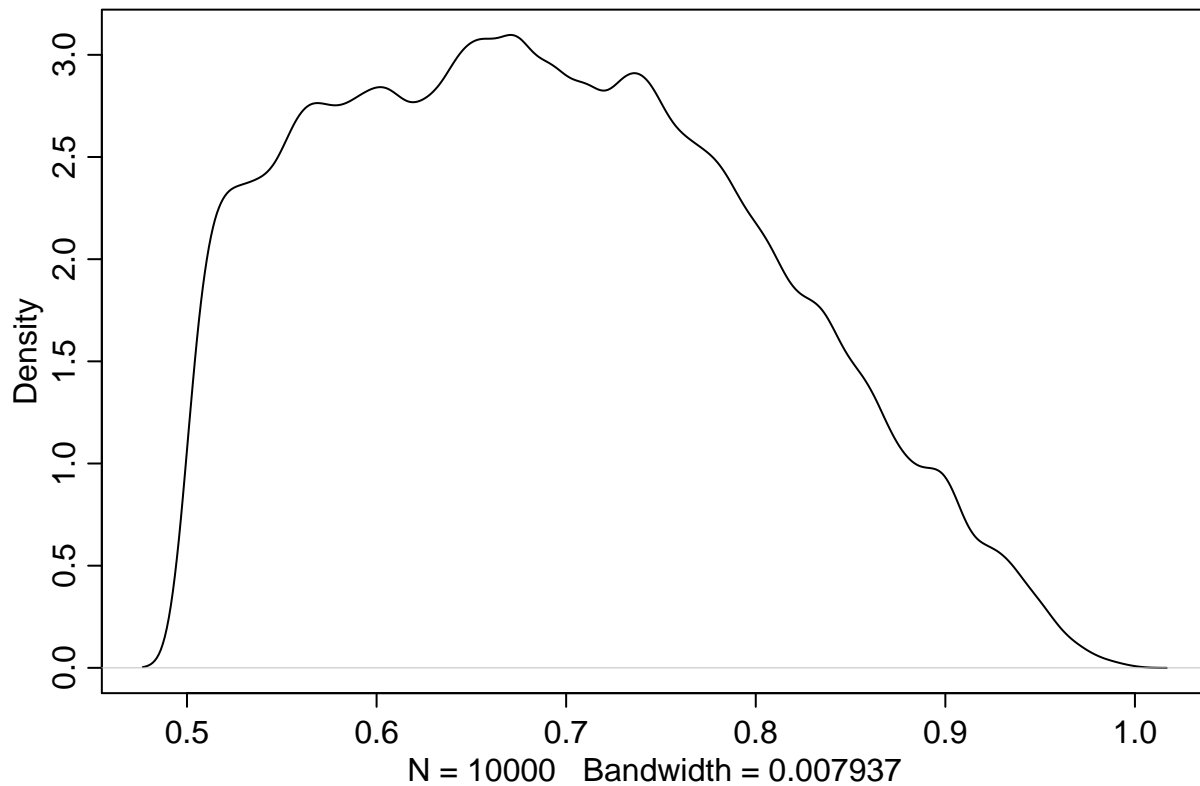
Question 3. For the posterior distribution from 2, compute 89% percentile and HPDI intervals. Compare the widths of these intervals. Which is wider? Why? If you had only the information in the interval, what might you misunderstand about the shape of the posterior distribution?

```
p.PI <- PI(samples2)
p.HDPI <- HPDI(samples2)

p.HDPI < p.PI
```

```
## |0.89 0.89|
##  TRUE  TRUE
```

3

N = 10000   Bandwidth = 0.007578