Chapter-03-assignment.R

Ruijuan

February 23, 2016

install packages

```
library(rmarkdown)
library(rstan)
```

```
## Loading required package: ggplot2
```

```
## rstan (Version 2.9.0-3, packaged: 2016-02-11 15:54:41 UTC, GitRev: 05c3d0058b6a)
```

```
## For execution on a local, multicore CPU with excess RAM we recommend calling
## rstan_options(auto_write = TRUE)
## options(mc.cores = parallel::detectCores())
```

```
library(rethinking)
```

```
## Loading required package: parallel
```

```
## rethinking (Version 1.58)
```

R code 3.27

```
p_grid <- seq(0, 1, length.out = 1000)
prior <- rep(1, 1000)
likelihood <- dbinom(6, size = 9, prob = p_grid)
posterior <- likelihood * prior
posterior <- posterior/sum(posterior)
set.seed(100)
samples <- sample(p_grid, prob = posterior, size = 1e4, replace = TRUE)
```

use the values in samples to answer the questions

3E1-3E3 the intervals of defined boundary

3E1. How much posterior probability lies below p=0.2

```
sum(posterior[p_grid < 0.2])
```

```
## [1] 0.0008560951
```

```
sum(samples<0.2)/1e4
```

```
## [1] 5e-04
```

3E2. How much posterior proabbility lies above p=0.8

```
sum(posterior[p_grid > 0.8])
```

```
## [1] 0.1203449
```

```
sum(samples>0.8)/1e4
```

```
## [1] 0.1117
```

3E3. How much posterior probability lies between p=0.2 and p=0.8

```
sum(posterior[p_grid > 0.2 & p_grid<0.8])
```

```
## [1] 0.878799
```

```
sum(samples>0.2 & samples<0.8)/1e4
```

```
## [1] 0.8878
```

The intervals of defined mass

3E4. 20% of the posterior probability lies below which value of p?

```
quantile(samples, 0.2)
```

```
##       20%
## 0.5195195
```

3E5. 20% of the posterior probability lies above which value of p?

```
quantile(samples, 0.8)
```

```
##       80%
## 0.7567568
```

3E6. Which values of p contain the narrowest interval equal to 66% of the posterior probability?

```
HPDI(samples, prob = 0.66)
```

```
##     |0.66     0.66|
## 0.5205205 0.7847848
```

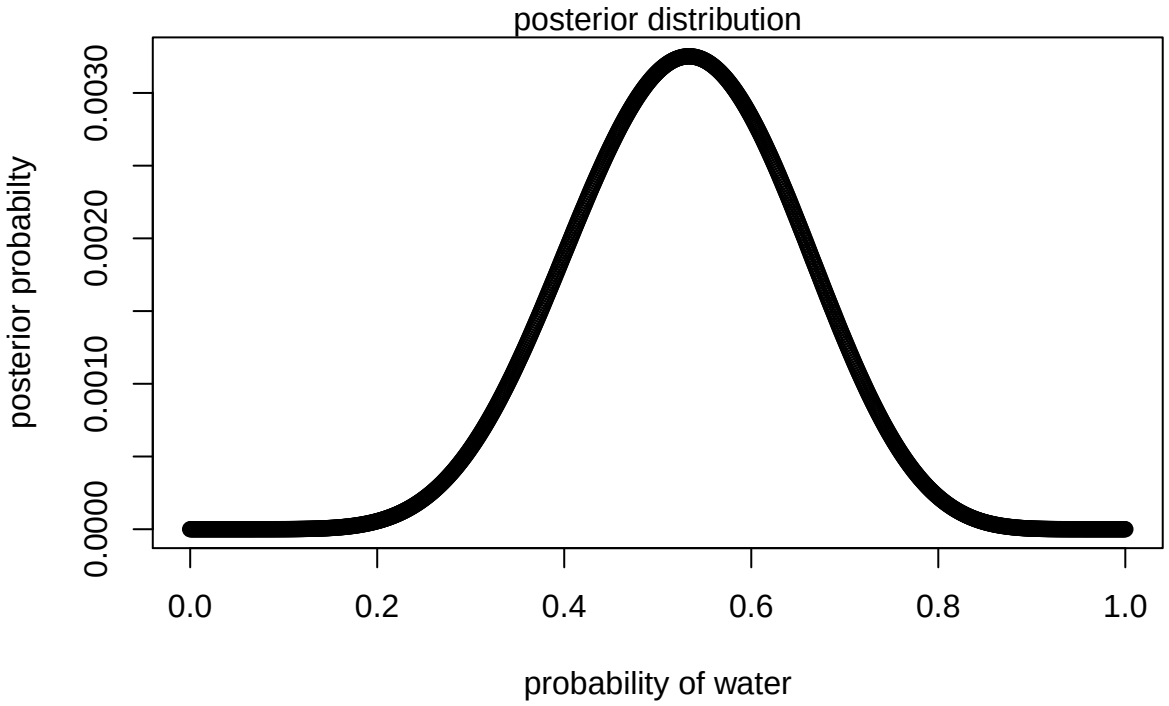
3E7. Which values of p contain 66% of the posterior probability, assuming equal posterior proability both below and above the interval?

```
PI(samples, prob = 0.66)
```

```
##       17%       83%
## 0.5005005 0.7687688
```

3M1. Suppose the globe tossing data had turned out to be 8 water in 15 tosses.
Construct the posterior distribution, using grid approximation. Use the same flat prior as before

```
p_grid <- seq(0, 1, length.out = 1000)
prior <- rep(1, 1000)
likelihood <- dbinom(8, size = 15, prob = p_grid)
posterior <- likelihood * prior
posterior <- posterior/sum(posterior)
```



3M2. Draw 10,000 samples from the grid approximation from above.

Then use the samples to calculate the 90% HPDI() for p.

```
set.seed(8808)
samples <- sample(p_grid, prob = posterior, size = 1e4, replace = TRUE)
# the 90% highest posterior density (narrowest) interval
HPDI(samples, prob = 0.9)
```

```
##      |0.9      0.9|
## 0.3413413 0.7317317
```

STOP AFTER 3M2 FOR 02/25 ASSIGNMENT

3M3

3M4

3M5

3H1

3H2

3H3

3H4

3H5