Chapter 3: Sampling the Imaginary

Quang Nguyen

8/8/2020

```
library(rethinking)
library(glue)
```

Easy problems rely on the following code:

```
p_grid <- seq(from = 0, to = 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 = T)
```

3E1.

Posterior probability that lies below $p = 0.2$

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

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

3E2

Posterior probability that lies above $p = 0.8$

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

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

3E3

Posterior probability lies between $p = 0.2$ and $p = 0.8$

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

```
## [1] 0.888
```

3E4

20% of the posterior probability lies below p value of

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

```
##       20%
## 0.5185185
```

3E5

20% of the posterior probability lies above the p value of

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

```
##       80%
## 0.7557558
```

3E6

Values of p containing the narrowest interval equal to 66% of the posterior probability

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

```
##     |0.66     0.66|
## 0.5085085 0.7737738
```

3E7

Values of p containing the interval with 66% of the posterior probability assuming equal posterior probability both below and above the interval

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

```
##       17%       83%
## 0.5025025 0.7697698
```

3M1