Chapter 03 Practice Problems

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Solutions

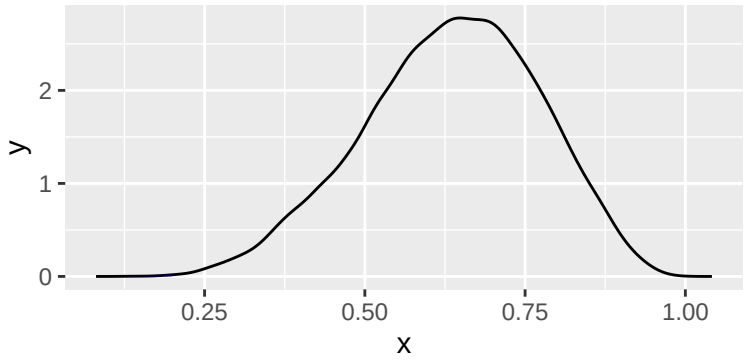
Setup code for problems:

```
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=TRUE)
```

Problem 3E1

```
sum(samples < .2)/length(samples)
```

```
## [1] 4e-04
```

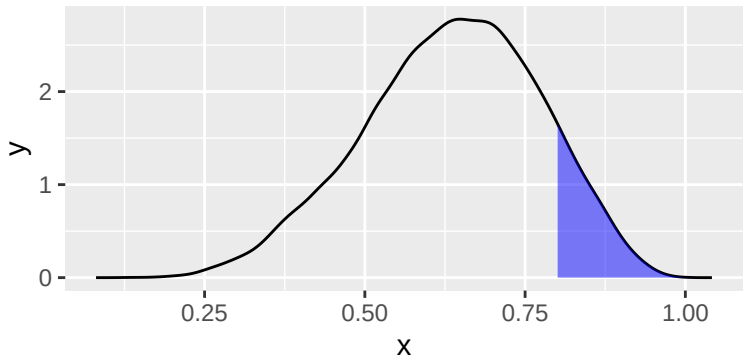


In the above plot, the shaded region (from -Infinity to .2) is too small to see.

Problem 3E2

```
sum(samples > .8)/length(samples)
```

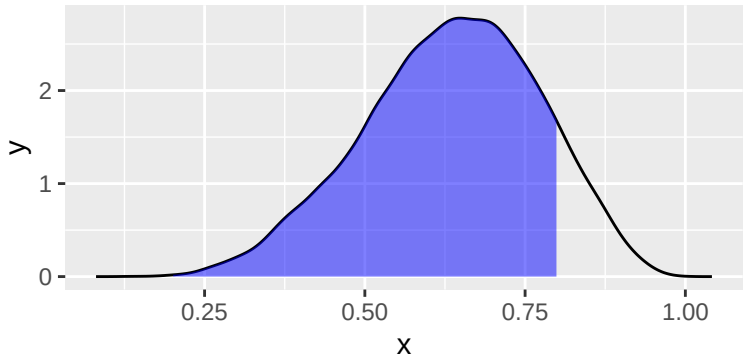
```
## [1] 0.1116
```



Problem 3E3

```
sum(samples > .2 & samples < .8)/length(samples)
```

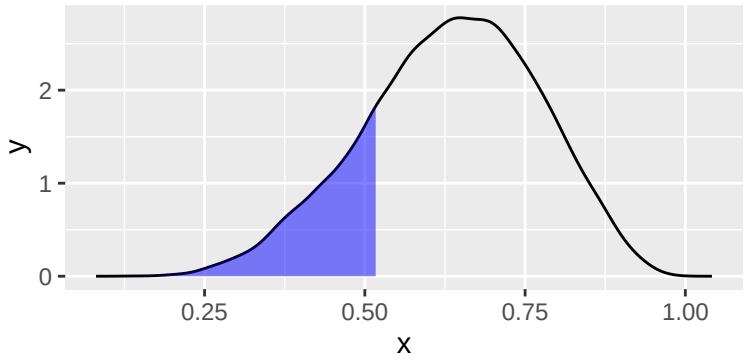
```
## [1] 0.888
```



Problem 3E4

```
quantile(samples, .2)
```

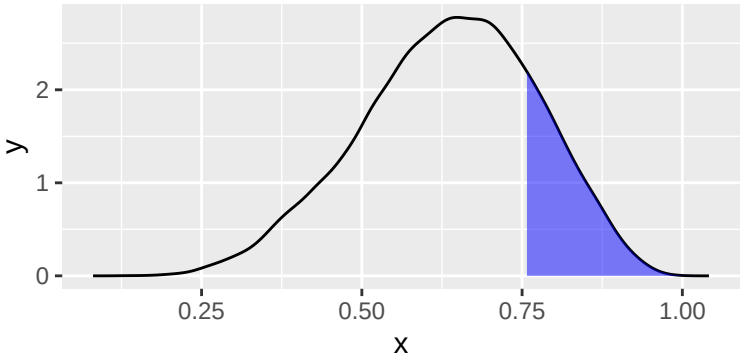
```
##       20%
## 0.5185185
```



Problem 3E5

```
quantile(samples, .8)
```

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



Problem 3E6

```
rethinking::HPDI(samples, prob=.66)
```

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

Problem 3E7

Solving this two ways (with *rethinking* and without)

```
quantile(samples, probs=c((1-.66)/2, 1-(1-.66)/2))
```

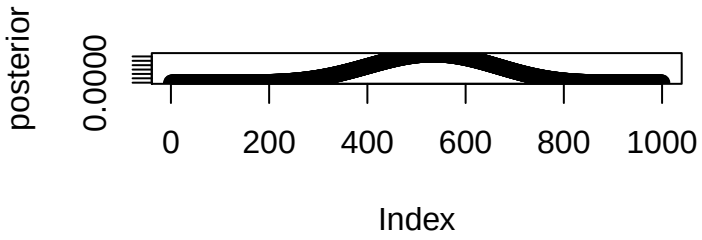
```
##       17%       83%
## 0.5025025 0.7697698
```

```
rethinking::PI(samples, prob=.66)
```

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

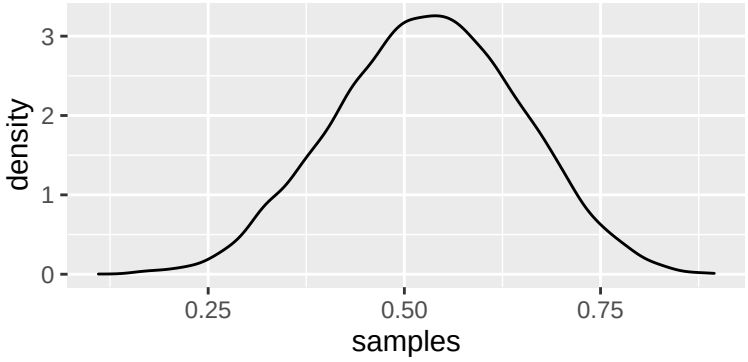
Problem 3M1

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



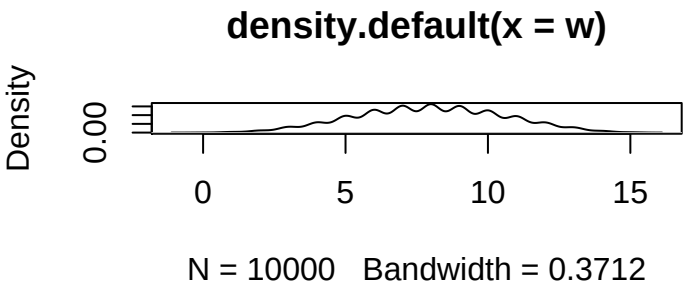
Problem 3M2

```
samples <- sample(p_grid, size=10000, replace=TRUE, prob=posterior)
```



Problem 3M3

```
w <- rbinom(1e4, size=15, prob=samples)
plot(density(w))
```



Problem 3M4

Problem 3M5

Problem 3M6