677 HW1

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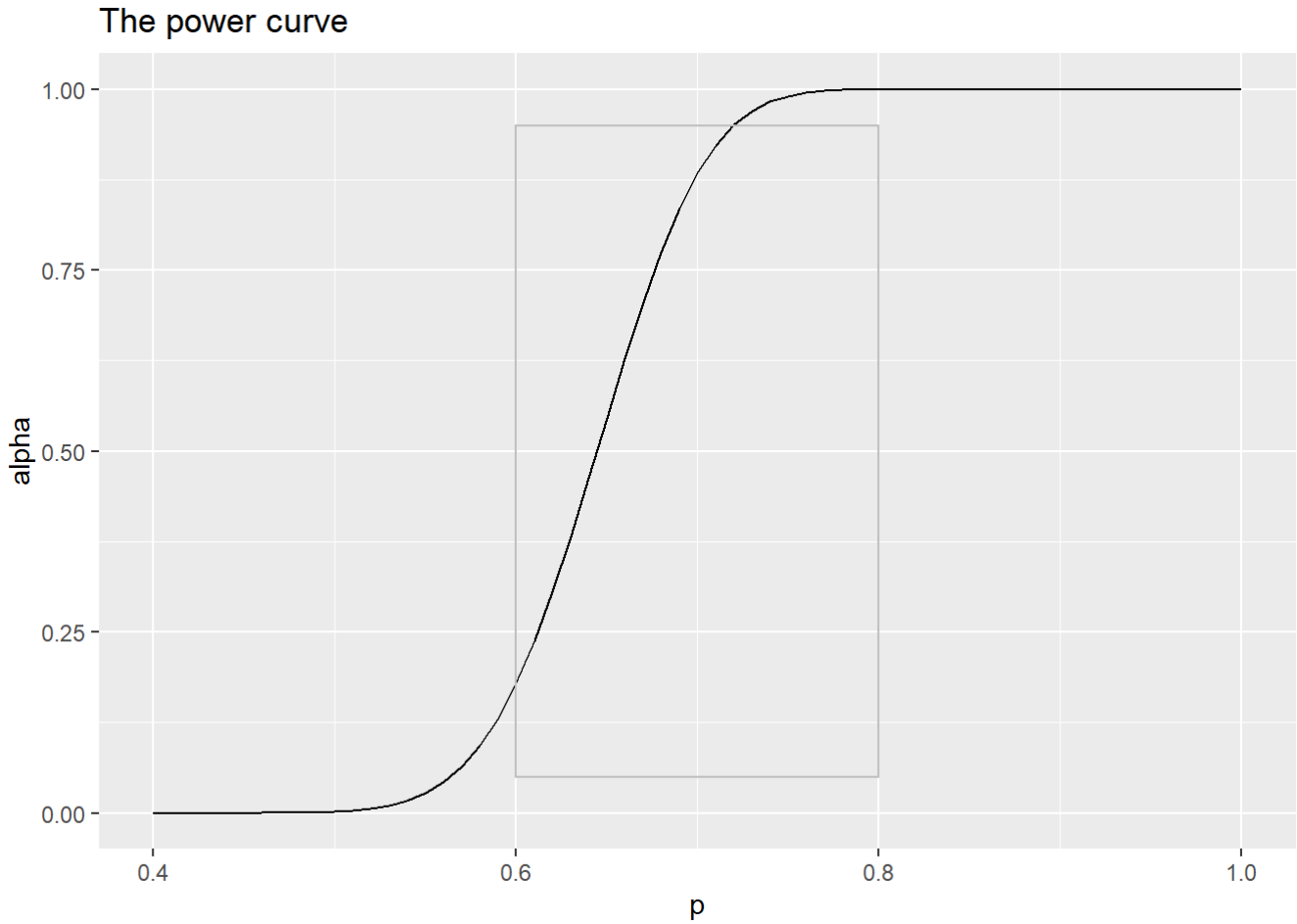
To show how did the author of the book get critical value m that while m=69 to thwarts type 1 error and m= 73 to thwarts type 2 error, I write a function named Plot to show the process of finding these two critical value. I set p as a sequence from 0.4 to 1 by 0.01 each. I used probability density function to get desired a(p), the sum probability we reject the null hypothesis is true.

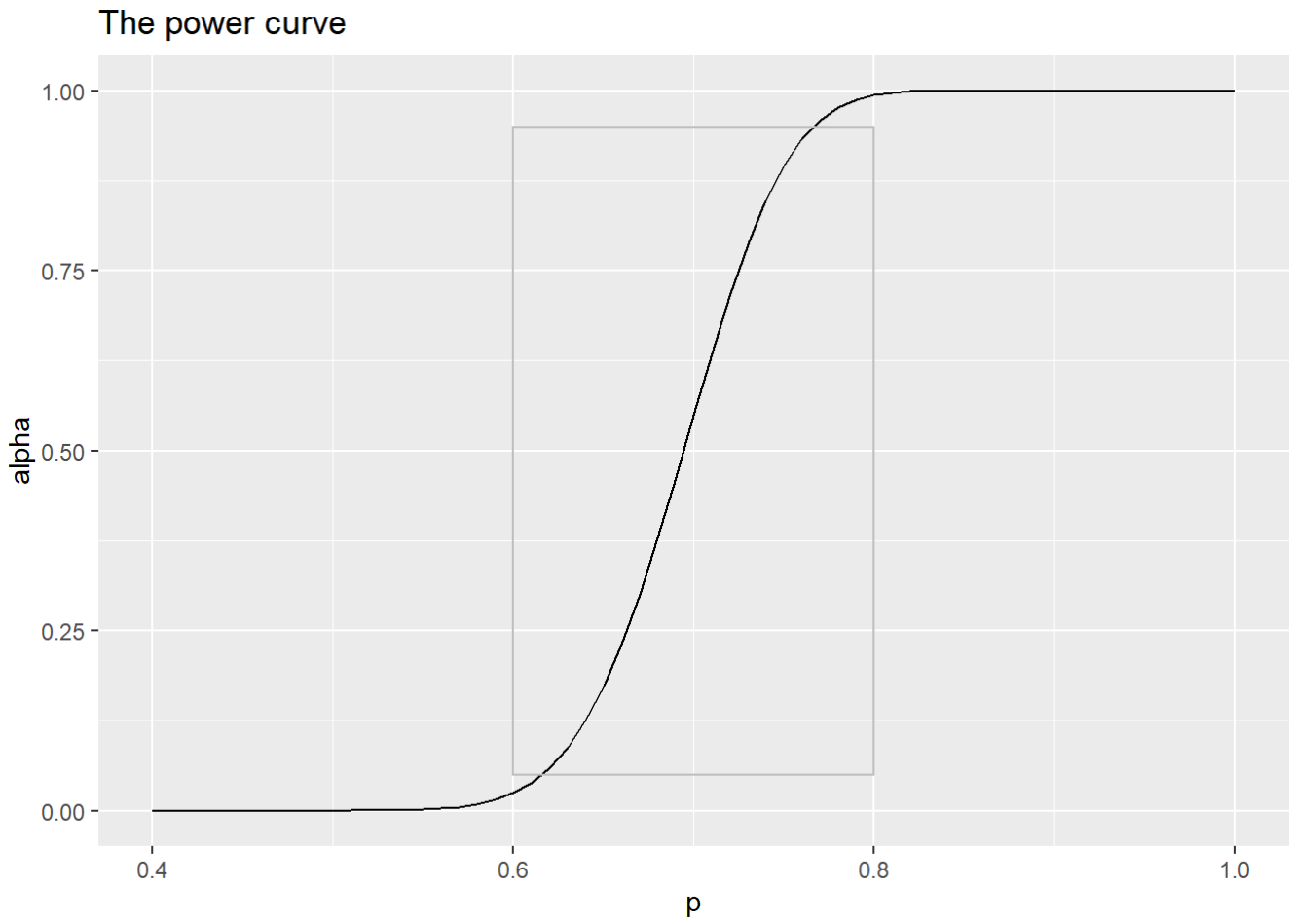
```
library(ggplot2)
Plot <-function(m){
n <-100
p <-seq(0.4,1,0.01)
ap <-c()
for (i in p){
  a <- sum(dbinom(m:n,n,i))
  ap <-c(ap,a)
}
ggplot()+geom_line(aes(p,ap))+geom_rect(aes(xmin = 0.6, xmax = 0.8, ymin = 0.05, ymax = 0.95),a
lpha=0,color="grey")+ggtitle("The power curve")+ylab("alpha")
}
```

I started to plug value of m from 0-100 to find the critical values which pass the bottom left and top right of the rectangle in Figure 3.7. As the m increases, the line moves to the right. Examples of m= 65, 70, 75.

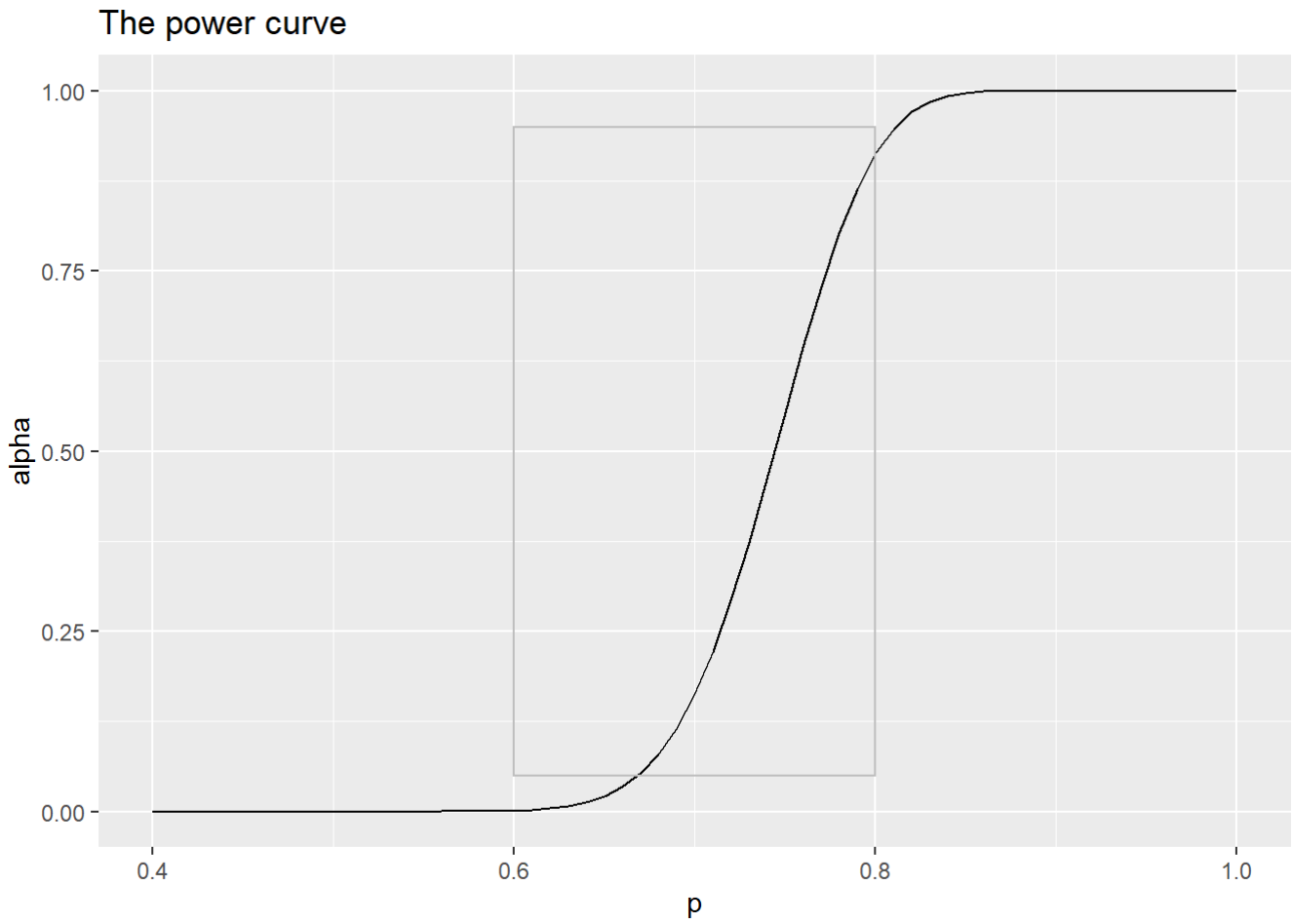
```
Plot(65)
```



```
Plot(70)
```

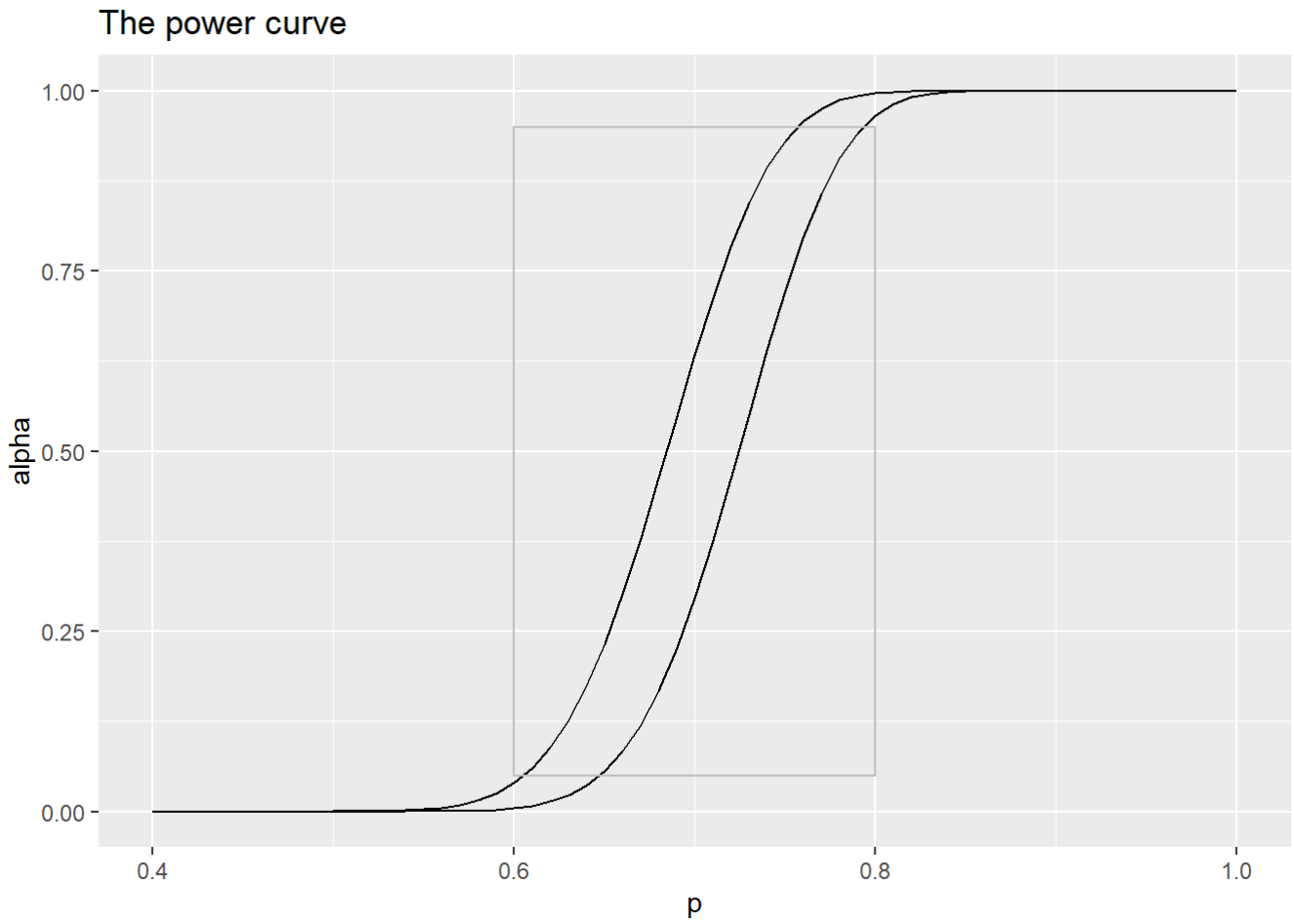



```
Plot(75)
```



After narrowing down numbers, I found while m=69, the line just enters the bottom, and whole m=73, the line just leaves from the top. Therefore, 69 is the smallest m thwarts type 1 error and 73 is the largest which thwarts a type 2 error.

```
n <-100
p <-seq(0.4,1,0.01)
ap69 <-c()
for (i in p){
  a <- sum(dbinom(69:n,n,i))
  ap69 <-c(ap69,a)
}
ap73 <-c()
for (i in p){
  a <- sum(dbinom(73:n,n,i))
  ap73 <-c(ap73,a)
}
ggplot()+geom_line(aes(p,ap69))+geom_line(aes(p,ap73))+geom_rect(aes(xmin = 0.6, xmax = 0.8, ym
in = 0.05, ymax = 0.95),alpha=0,color="grey")+ggtitle("The power curve")+ylab("alpha")
```


The power curve
1.00
0.75
0.50
0.25
0.00
alpha
0.4
0.6
0.8
1.0
p