

HW1

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From the example, the $m=69$ is the smallest value for m that thwarts a type 1 error, while $m=73$ is the largest which thwarts a type 2. Therefore, we may choose our critical value between 69 and 73. I will show how we get this value by calculation below.

#Discuss with Haoqi

#Firstly, I built a binomial model for type1

```
n <- 100
p <- 0.6
t <- 100-n*p
m1=rep(0,t)
p1=rep(0,t)
for(i in 0:t){
  m1[i]=i+n*p
  p1[i]=pbinom(n,n,p)-pbinom(m1[i]-1,n,p)
}
a <- data.frame(cbind(m1,p1))
```

#the significance value is 0.05

```
a1 <- a[which(a$p1<0.05),1]
```

#The minimal value for type 1

```
print(min(a1))
```

```
## [1] 69
```

#Secondly, I built a binomial model for type1

```
n1 <- 100
p1 <- 0.8
t1 <- 100-n1*p1
m2=rep(0,t1)
p2=rep(0,t1)
for(i in 0:t1){
  m2[i]=n1*p1-i
  p2[i]=pbinom(m2[i]-1,n1,p1)
}
b=data.frame(cbind(m2,p2))
```

#the significance value is 0.05

```
b1 <- b[which(b$p2<0.05),1]
```

```
## [1] 73
```

Figure 3.7

```
n <- 100
p <- seq(from=0.4,to=1,by=0.01)
P_69=cumsum(dbinom(min(a1),n,p))
P_73=cumsum(dbinom(max(b1),n,p))
dt_plot=data.frame(p,P_69,P_73)
ggplot(dt_plot)+
  geom_rect(aes(xmin = 0.6, xmax = 0.8, ymin = 0.05, ymax = 0.95), alpha
a = 0.5,color="black", fill=NA)+
  geom_line(aes(p, P_69),color="black")+
  geom_line(aes(p, P_73),color="black")+
  ggtitle("Figure 3.7: The power Curve")
```

