MA677-G&S311

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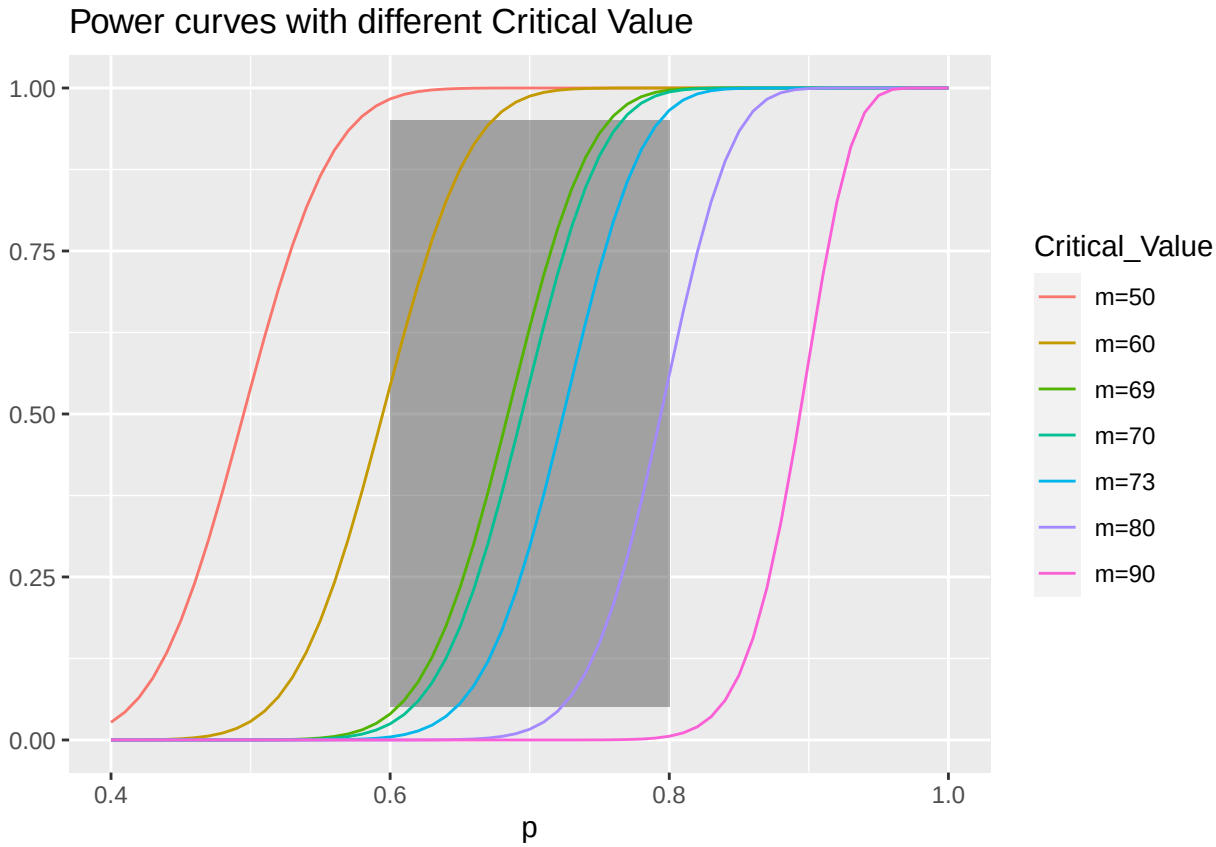
Explain why m between 69-73

```
###Build a function to plot power curve
Power_Cirve <- function(n,m,p_origin){

  p <- seq(p_origin,1,1/n)

  for (i in 1:length(m)){
  ###make the first part of the datasets
  if (i == 1){
    k=0
    for(j in m[1]:100){
   ##use dbinom() to provide the probability density distribution of each point
    k=k+dbinom(j,n,p)
     dt <- data.frame(p, Critical_Value=paste('m=',m[i],sep=''),k)
    }
  }
    ###use rbind() to make the left part of datasets
  else{
    k=0
    for(j in m[i]:100){
    k=k+dbinom(j,n,p)

    }
    dt <- rbind(dt,data.frame(p, Critical_Value=paste('m=',m[i],sep=''),k))
  }
}

 ##plot the power curve
ggplot()+
  geom_rect(aes(xmin = 0.6, xmax = 0.8, ymin = 0.05, ymax = 0.95), alpha = 0.5)+
  geom_line(aes(p, k, color = Critical_Value), dt)+
  labs(y=NULL,title = 'Power curves with different Critical Value')
}


Power_Cirve(100,c(50,60,69,70,73,80,90),0.4)
```

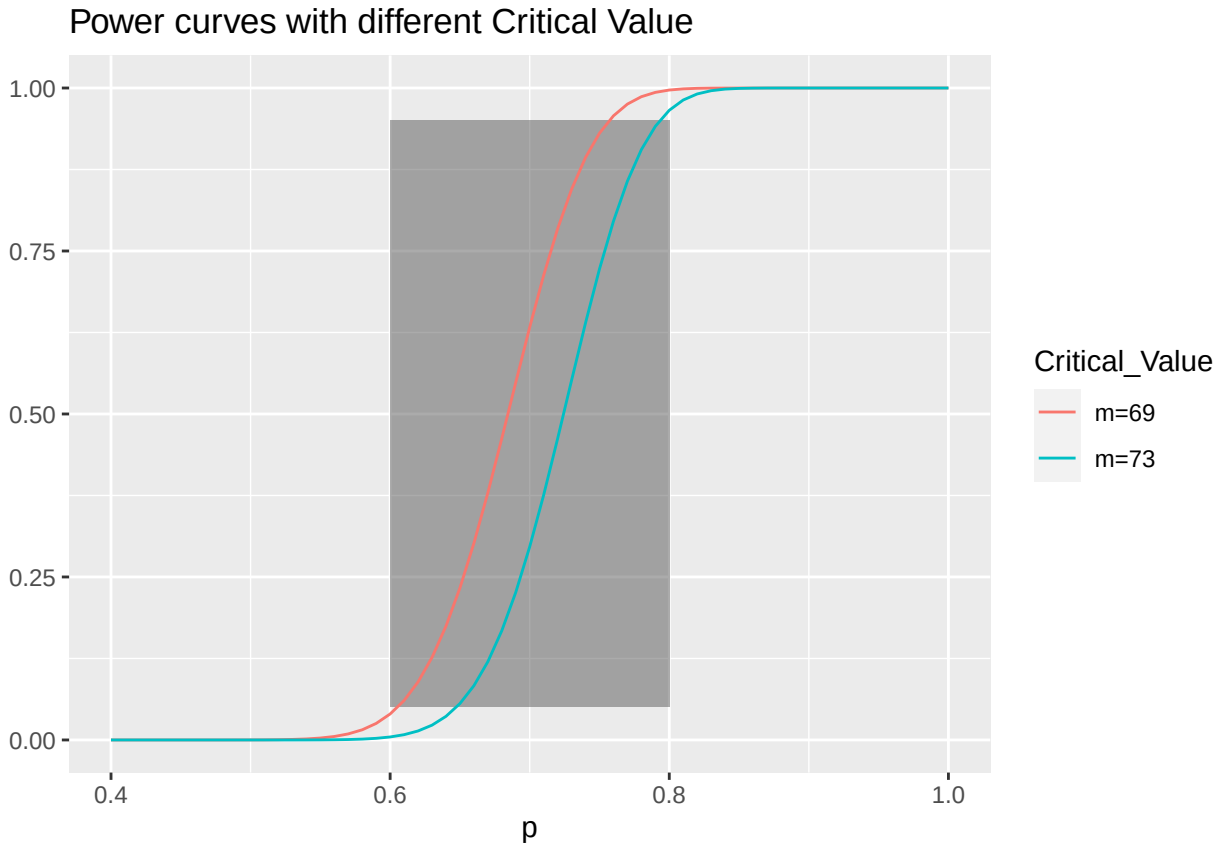


The x of gray rectangle represents the p of old drug is 0.6 and the p of new drug is 0.8. And the y of gray rectangle represents the critical number m can make each of these undesirable cases less than 5 percent probable.

As we can see, with increase of m, the curve will move to the right, and we can find that the curve which represents that critical value m is 69 crosses with the left bottom of the rectangle, which means that the probability of type 1 mistake is 5%. Also,the curve which represents that critical value m is 73 crosses with the right top of the rectangle, which means that the probability of type 2 mistake is 5%(1-95%).

Show the Figure 3.7

```
Power_Cirve(100,c(69,73),0.4)
```


Power curves with different Critical Value
1.00
0.75
0.50
0.25
0.00
0.4
0.6
0.8
1.0
p
Critical_Value
m=69
m=73