MA677_Assignment1

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1.Find m is in [69,73]

From the context, the significance level is 0.05. This indicates that it is acceptable to have a 5% probability of incorrectly rejecting the true null hypothesis (Type I error).

Referring to Z-table, we have z = 1.65 or z = -1.65.

We also know that $\alpha(.6)$ is the upper tail of the a binomial distribution, and $\alpha(.8)$ is the lower tail of a binomial distribution.

According to the equation:

$$z = \frac{\hat{p} - p_o}{\sqrt{\frac{p_o(1-p_o)}{n}}}$$

We can get

$$\hat{p} = 1.65 * sqrt(0.6 * 0.4)/10 + 0.6 = 0.68$$

Thus

$$m = 0.68 * n = 68$$

Similarly,

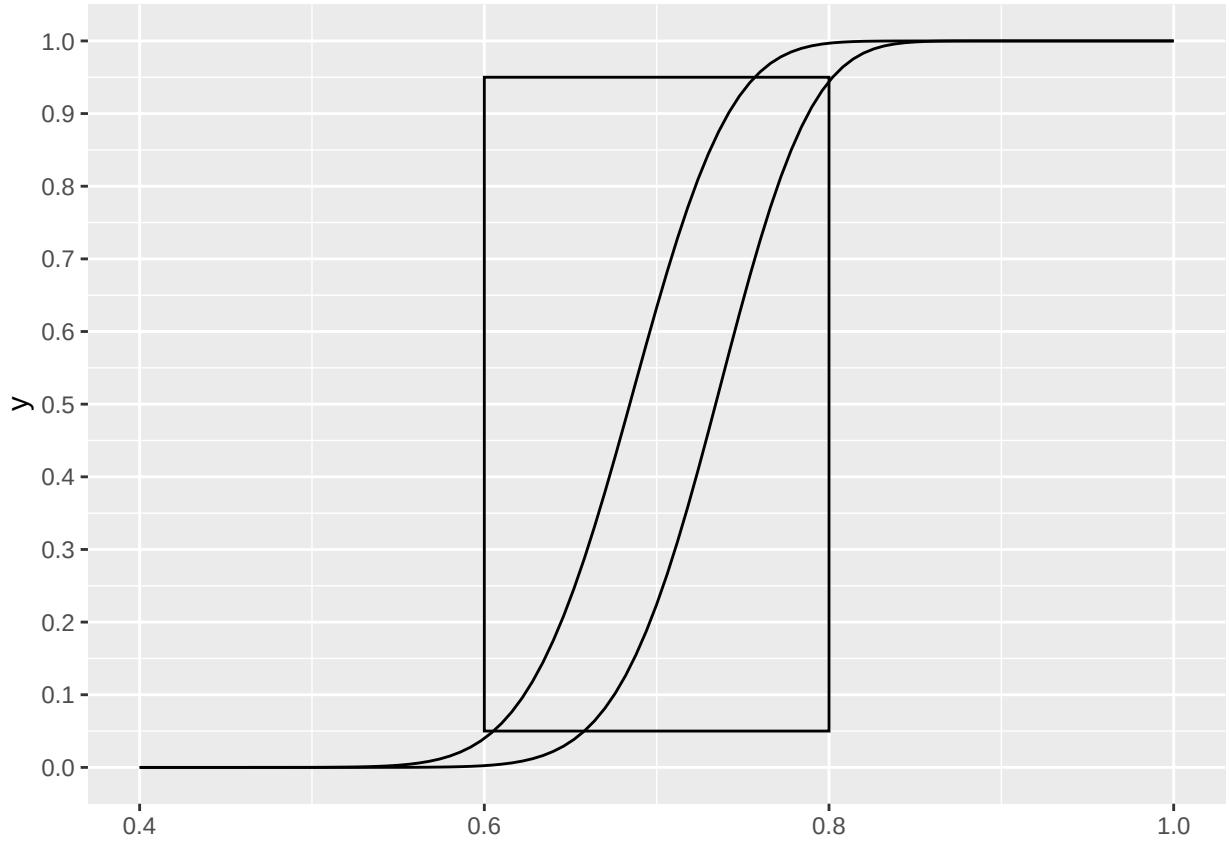
$$\hat{p} = -1.65 * sqrt(0.8 * 0.2)/10 + 0.8 = 0.73$$

$$m = 0.73 * n = 73$$

Thus, n is in [68,73]

2.Power Curve Plots

```
f1 <- function(p){
  P1 <- 1 - pbinom(68,100,p)
}
f2 <- function(p) {
  P2 <- 1 - pbinom(73,100,p)
}
ggplot() +
  stat_function(fun = f1) +
  stat_function(fun = f2) +
  scale_x_continuous(limits = c(0.4, 1)) +
  scale_y_continuous(breaks= seq(0, 1, 0.1)) +
  annotate("rect", xmin = 0.6, xmax = 0.8,
           ymin = 0.05, ymax = 0.95, alpha = 0.1, color = "black", fill = NA)
```


1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
y
0.4
0.6
0.8
1.0