Roll No-12

M.sc. 3rd semester

Date of Assignment-12/11/2020

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**Experiment No -05**

**Topic**- Tracing of power curve for Binomial Distribution.

**Problem** – A coin is tossed 20 times and we want to test whether the coin is unbiased. Construct the appropriate critical region and draw the power curve testing. The level of significance is-

**Theory and Calculation**-

Let, Probability of getting the heads.

To test whether the coin is unbiased we need to test the null hypothesis-



The critical region for testing the null hypothesis is given by-



Where and are the unknown constants to be determined such that 

Therefore, 



Where, 

Assuming that the test is equitailed we have-







And 



To find the value of k1 and k2, we use the following R-command-

K\_one=qbinom(0.7365,20,1/2)

K\_two=qbinom(0.2635,20,1/2)

K\_one

K\_two

Therefore, k\_one=11 k\_two=9 k\_three=10

Therefore, the C.R. is given by-



Power of the test is given by-

Power== [Reject is true]







Now to draw the power curve for testing , we construct the following table considering different trial values of and using the R- program given below-

**Programming in R**

library('ggplot2')

k\_one=qbinom(0.7365,20,1/2)

k\_one

k\_two=qbinom(0.2635,20,1/2)

k\_two

k\_three=k\_two+1

k\_three

theta=seq(from=0.21, by=0.02, length.out=40)

power=mat.or.vec(40,1)

for(i in 1:40){

power[i]=pbinom(9,20,theta[i])+1-pbinom(11,20,theta[i])}

power

Table=data.frame(theta,power)

Table

View(Table)

ggplot(data=Table,mapping=aes(x=theta,y=power))+geom\_point()+geom\_line()

data.frame(theta)

data.frame(power)

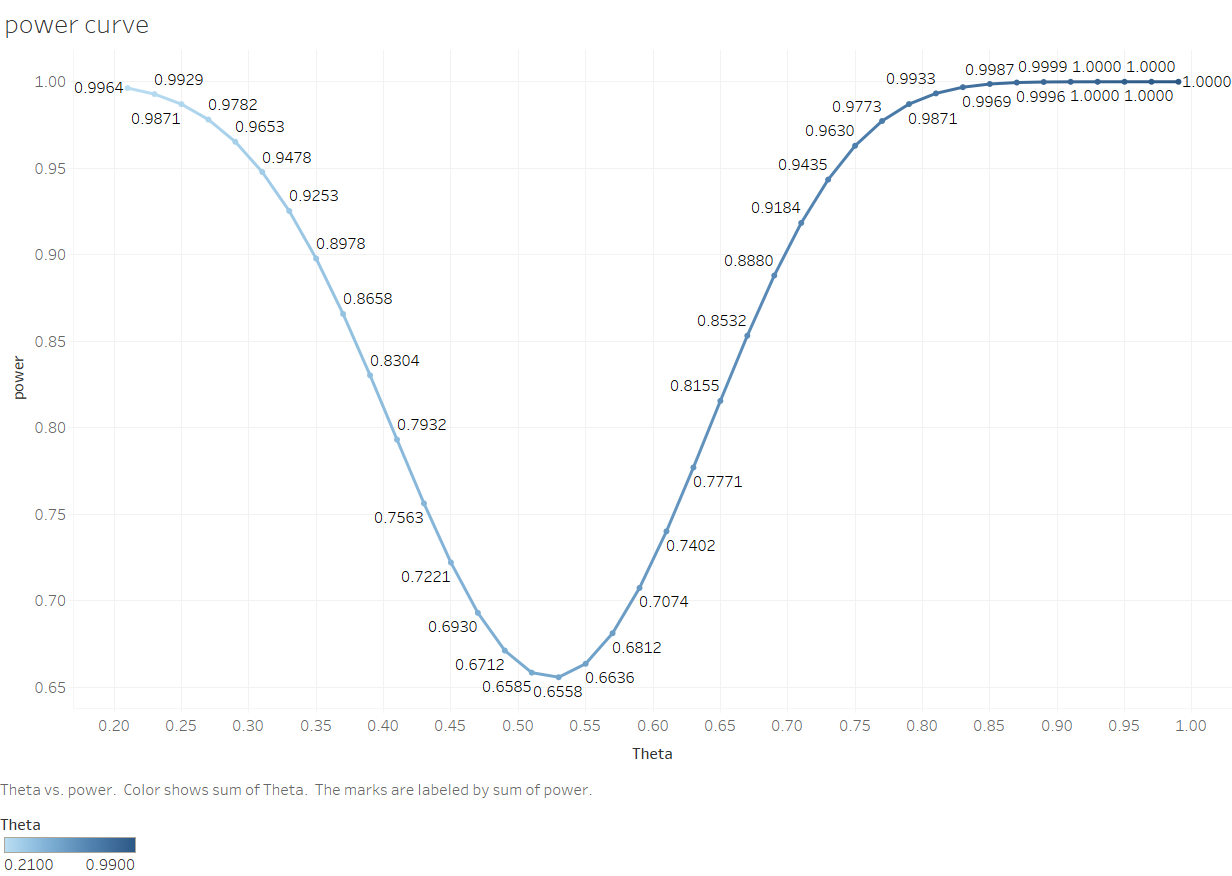
**TABLE**

|  |  |
| --- | --- |
| **Trial values of** | **Power** |
| 0.21  0.23  0.25  0.27  0.29  0.31  0.33  0.35  0.37  0.39  0.41  0.43  0.45  0.47  0.49  0.51  0.53  0.55  0.57  0.59  0.61  0.63  0.65  0.67  0.69  0.71  0.73  0.75  0.77  0.79  0.81  0.83  0.85  0.87  0.89  0.91  0.93  0.95  0.97  0.99 | |  | | --- | | 0.9963770  0.9928696  0.9870710  0.9781552  0.9653023  0.9478274  0.9253237  0.8977988  0.8657787  0.8303570  0.7931724  0.7563092  0.7221262  0.6930302  0.6712233  0.6584551  0.6558150  0.6635956  0.6812466  0.7074289  0.7401629  0.7770509  0.8155443  0.8532157  0.8880019  0.9183819  0.9434700  0.9630170  0.9773254  0.9871034  0.9932855  0.9968570  0.9987097  0.9995518  0.9998751  0.9999744  0.9999967  0.9999998  1.0000000  1.0000000 | |  | | |  | | --- | |  | | |

**Power curve by using ggplot 2**



**Power curve generated by using Tableau**

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