**Q 4.6.1 Calculate maximum likelihood for the following data**

Sample (0, 1, 0, 0, 1, 0) from binomial distribution, what is the maximum likelihood estimate of **µ**?

P (X =1) = **µ;** P (X =0) =1- **µ**

L (**µ**) = P(X = 0) \* P (X =1) \* P(X = 0) \* P(X = 0)\* P (X =1) \* P(X = 0)

= (1- **µ**) \* (**µ**) \* (1- **µ**) \* (1- **µ**) \* (**µ**) \* (1- **µ**)

= (1- **µ**) 4 \* (**µ**) 2

Applying Log for easing calculations

Log L (**µ**) = Log ((1- **µ**) 4 \* (**µ**) 2 ) = 4 \* Log (1- **µ**)+ 2 \* Log (**µ**)

In order to determine maximum/minimum of any function, we need to take derivative and equal to zero. For clarifying whether it is maximum or minimum, we need to do double derivative, if it turns out negative it is maximum, else if it is positive then it is minimum value.

Now taking double derivative

Means, it is less than 0, hence we can confirm that it is maximum value.

By substituting the value 1/3 in maximum function, we get the maximum likelihood

L (**µ**) = (1- 1/3)4 \* (1/3)2= 0.308

Log L (**µ**) = 4 \* Log (1- **µ**)+ 2 \* Log (**µ**)= 4 \*Log (2/3) + 2 \* Log (1/3) = -1.658

-2 Log L (**µ**) = -2 \* -1.658 = **3.3172**

**Exercise for you on Poisson distribution:**

Samples 5,9,3,12,14

And the function is

Maximum likelihood of **λ** =?

Answer: **λ** = 43/5