***Session 4 – Assignment\_4.41189***

***Problem Statement:***

A test is conducted which is consisting of 20 MCQs (multiple choices questions) with every MCQ having its four options out of which only one is correct. Determine the probability that a person undertaking that test has answered exactly 5 questions wrong.

***Solution:***

The formula for calculating the achievement of ‘k’ successes in ‘n’ trials is given below:

P (‘k’ successes in ‘n’ trials) = C(n,k) sk(1−s)(n−k)

C (n, k) is called the coefficient for binomial distribution or binomial coefficient. It is on this coefficient that the distribution is named. The factorial of any number ‘m’ is the product of all-natural numbers starting from m, (m - 1) to 1.

Where C (n, k) = n! / ((n−k)! k!)

n! = n \* (n - 1) \* … \* 2 \* 1

Here, n = 20, n - k = 5, k = 20 - 5 = 15

Here the probability of success = probability of giving a right answer = s = 1/4

Hence, the probability of failure = probability of giving a wrong answer = 1 - s

= 1 – (¼) = 3/4

When we substitute these values in the formula for Binomial distribution we get,

So, P (exactly 5 out of 20 answers incorrect) = C (20, 5) \* (1/4) 15 \* (3/4) 5

= P (5 out of 20) =[ (20∗19∗18∗17∗16) / (5∗4∗3∗2∗1)]\* (1/4) 15 \* (3/4) 5

= 0.0000034 (approximately)

Thus the required probability is 0.0000034 approximately.