Assignment – 17.1

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:

Let

- ‘n’ is representing the number of trials attempted, and that
- ‘k’ is the count of successes that is to be attained in those
- This implies that number of failures clearly will be ‘n - k’.

n = 20 (No of MCQs) , k = 20 - 5 = 15 , n - k = 5

if ‘s’ is the probability of succeeding in a trial, we get that the probability of failure is ‘1 - s’.

success = Correct Answer,

p(success) = 1/4 and P(failure) = 1-1/4 = 3/4

Using Binomial distribution

Probability (Exactly 5 Questions Wrong) = Probability (15 Questions Correct)

$= C(n,k)\ s^{k}\ (1-s)^{(n-k)}$

$= C\,(20, 15) * (\tfrac{1}{4})^{15} * (\tfrac{3}{4})^{5}$

= [(20!) / (15! *5!)] * (1/4) ^15 * (3/4) ^5

- C (20,15) = 15504
- (1/4) ^15 = 0.00000000093132257462
- (3/4) ^ 5 = 0.237304688

P(5 Questions Wrong) = 15504*0.00000000093132257462*0.237304688

= 3.4265E-06

Thus the probability that a person taking a test of 20 MCQs and getting exactly 5 wrong answers = 0.0000034265