**Problem Statement 1:**

**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:**

Number of Multiple Choice Questions(MCQ): 20

Each Multiple-Choice Question(MCQ) has 4 options, out of which, 1 option is the right answer.

Probability of answering one MCQ correctly is 1/4 (1 out of 4 options)

Probability of answering one MCQ wrongly is 3/4 (3 out of 4 possible options are wrong)

Going by the Binomial Distribution formula,

P(x) = n! / (x! (n-x)!) \* P(s)^x \* (1-P(s)) ^(n-x)

Now, x =5 (Number of incorrect occurrences, that we are targeting for)

n = 20 = number of trials, i.e, number of MCQs in this context

P(s) = probability of success of 1 MCQ = ¼

1-P(s) = 1 – 1/4 = 3/4 (This is the probability of failure)

P (5) = 20! / (5! (20 – 5)!) \* (1 – 1/4)5 \*(1/4) (20 – 5)

= 20! / (5! \* 15!) \* (0.25)5 \* (0.75)15

= (2432902008176640000 / (120 \* 1307674368000)) \* 0.2373046875 \* 0.000000000931322574615478515625

= 3.426495823077857494354248046875e-6

= 0.000003426