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.

In [1]:
```
# No of MCQ(multiple choices questions) = 20
# Exact No of Wrong Answer              = 5
# No of Correct Answers                 = 20-5=15
# Probability of giving right Answer    = 1/4     # as MCQ has 4 options 1 right (
# Probability of giving wrong Answer    = 1-1/4 = 3/4     # as MCQ has 4 options 1

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

def factorial(n):
    if n == 0:
        return 1
    else:
        return n * factorial(n-1)

# Lets calculate C (20, 5) * (1/4)^15 * (3/4)^5

P = (factorial(20)/(factorial(15)*factorial(5))) * ((1/4)**15)*((3/4)**5)  # 5 out
P

# Hence probability is = 0.0000034 (approximately)
```

Out[1]:
```
3.4264958230778575e-06
```

A die marked A to E is rolled 50 times. Find the probability of getting a "D" exactly 5 times.

In [2]:
```
# No of times die rolled out                    = 50
# No of outcomes(A,B,C,D,E)                     = 5
# P (Success) -Probability of D at one roll     = 1/5
# P (Failure)                                   = 1-1/5 = 4/5

P = ((1/5)**5)*((4/5)**45)
P
```

Out[2]:
```
1.3937965749081678e-08
```

Problem Statement 3:

Two balls are drawn at random in succession without replacement from an urn containing 4 red balls and 6 black balls.

Find the probabilities of all the possible outcomes.

In [4]:
```
# In the first draw we have 10 balls
# In the second draw we have 9 balls

# There will be only 4 possible outcomes mentioned below along with probability

# Probability of drawing Red balls only   p(RR)               -->     (4/10)(3/9)
# Probability of drawing 1 Red and 1 Black ball p(RB)         -->     (4/10)(6/9)
# Probability of drawing 1 Black and 1 Red ball p(BR)         -->     (6/10)(4/9)
# Probability of drawing Black balls only   p(BB)             -->     (6/10)(5/9)

# Since we have done all the possible probability distribution, summation of all

2/15+4/15+4/15+1/3
```

Out[4]: 1.0