In [6]:
```
# 1. A test is conducted which is consisting of 20 MCQs (multiple choices ques
tions) with every MCQ having its four
# options out of which only one is correct. Determine the probability that a p
erson undertaking that test has
# answered exactly 5 questions wrong.

import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import binom
from scipy.special import factorial
```

In [19]:
```
#Assume that in an experiment , 'n' represent the trails attempted,
#The count of successes that is to be attained in those ‘n’ trials is represen
ted by 'k'
#The failures is calculated as ‘n - k’.

n = 20
#n - k  = 5
Failures = 5
k = 15

#Probability of success(Correct answer) = p_s
p_s = Failures / n

#Probability of failure (Wrong answer)=p_f
p_f = 1 - p_s

#Using the formula for binomial distribution we get the probability value as

P = (factorial(n) /(factorial(k) * factorial(n - k))) * np.power(p_s,k) * np.p
ower(p_f,Failures)

print("The probability of getting exactly 5 out of 20 answers incorrect is {:
0.7f}".format(P))
```

```
The probability of getting exactly 5 out of 20 answers incorrect is 0.0000034
```

In [24]:
```
# 2. A die marked A to E is rolled 50 times. Find the probability of getting a
 “D” exactly 5 times.

#Assume that in an experiment , 'n' represent the trails attempted,
#The count of successes that is to be attained in those ‘n’ trials is represen
ted by 'k'
#The failures is calculated as ‘n - k’.

n = 50
k =5
Failures = n - k
#Probability of success (Getting a 'D')= p_s
p_s = 1/k

#Hence, the probability of failure (Not getting a 'D')= p_f
p_f = 1 - p_s

print("The probability of getting a 'D' in {} throws out of  {} number of trai
ls conducted is {}".format(k,n,p_s))
```

```
The probability of getting a 'D' in 5 throws out of  50 number of trails cond
ucted is 0.2
```

In [25]:
```
# 3.Two balls are drawn at random in succession without replacement from an ur
n containing 4 red balls and 6 black balls.
# Find the probabilities of all the possible outcomes.

red_ball = 4
black_ball = 6
total_balls = red_ball + black_ball

#Possible outcomes= {Red_ball and Black_ball,Black_ball and Red_ball,Black_bal
l and Black_ball,Red_ball and Red_ball}

#So the chances of picking a red ball first is 4 out of 10 balls. So the proba
bility is 4/10.
p_first_red_ball = red_ball / total_balls

#So the chances of picking a black ball second is 6 out of 9 balls. So the pro
bability is 6/9.
p_second_black_ball  = black_ball / (total_balls - 1)

#So the chances of picking a black ball  first is  6 out of 10 balls. So the p
robability is 6/10.
p_first_black_ball = black_ball / total_balls

#So the chances of picking a red ball second is 4 out of 9 balls. So the proba
bility is 4/9.
p_second_red_ball  = red_ball / (total_balls - 1)
#Probability that both the balls are red is computed here as:
#= Total number of ways to select 2 red balls from the 4 red balls /
#    Total number of ways to select 2 black  balls from 10 total balls

P_2_r  = (factorial(red_ball) / (factorial(2) * factorial(red_ball - 2))) / (f
actorial(total_balls)
                                                                             /
 factorial(2)* factorial(total_balls - 2))

#Probability that both the balls are black is computed here as:
#= Total number of ways to select 2 black balls from the 6 red balls /
#    Total number of ways to select 2 black  balls from 10 total balls

P_2_b  = (factorial(black_ball) / (factorial(2) * factorial(black_ball -2))) /
 (factorial(total_balls)

  / factorial(2)* factorial(total_balls - 2))
```

In [27]:
```
print("The probabilities of all possible outcomes of picking Red ball first,Bl
ack Ball second is ({:0.2f},{:0.2f})".format
      (p_first_red_ball,p_second_black_ball))
print("The probabilities of all possible outcomes of picking black ball first,
red Ball second is ({:0.2f},{:0.2f})".format
      (p_first_black_ball,p_second_red_ball))
print("The probabilities of all possible outcomes of picking both the balls as
 black is {:0.10f}".format(P_2_b))
print("The probabilities of all possible outcomes of picking both the balls as
 red is {:0.10f}".format(P_2_r))
```

```
The probabilities of all possible outcomes of picking Red ball first,Black Ba
ll second is (0.40,0.67)
The probabilities of all possible outcomes of picking black ball first,red Ba
ll second is (0.60,0.44)
The probabilities of all possible outcomes of picking both the balls as black
is 0.0000000002
The probabilities of all possible outcomes of picking both the balls as red i
s 0.0000000001
```