EXPERIMENT NO : 4

AIM : TO SOLVE THE PROBLEMS FOR DISCRETE RANDOM VARIABLES USING BINOMIAL AND POISSON PROBABILITY DISTRIBUTIONS.

ROLL NO : 58

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In [1]:

```
import numpy as np
```

In [2]:

```
from scipy.stats import binom , poisson
```

Q1 A

1 Binomial Distribution

In [3]:

```
n=10
```

In [4]:

```
p=0.5
```

In [5]:

```
k=3
```

In [6]:

```
pmf_value=binom.pmf(k,n,p)
```

In [7]:

```
print("Probability of getting",k,"successes:",pmf_value)
```

```
Probability of getting 3 successes: 0.11718750000000014
```

In [9]:

```
cdf_value=binom.cdf(k,n,p)
```

In [10]:

```
print("Probability of getting at most",k,"successes :",cdf_value)
```

```
Probability of getting at most 3 successes : 0.17187499999999994
```

In [11]:

```
mean_value=binom.mean(n,p)
```

In [12]:

```
print("Mean of the binomial distribution :",mean_value)
```

```
Mean of the binomial distribution : 5.0
```

In [13]:

```
variance_value=binom.var(n,p)
```

In [14]:

```
print("Variance of the binomial distribution:",variance_value)
```

```
Variance of the binomial distribution: 2.5
```

In [15]:

```
std_deviation_value=binom.std(n,p)
```

In [16]:

```
print("Standad deviation of the binomial distribution :",std_deviation_value)
```

```
Standad deviation of the binomial distribution : 1.5811388300841898
```

Q1 B

In [44]:

```
n=11
```

In [45]:

```
p=0.4
```

In [46]:

```
k=2
```

In [47]:

```
pmf_value=binom.pmf(k,n,p)
```

In [48]:

```
print("Probability of getting",k,"successes:",pmf_value)
```

```
Probability of getting 2 successes: 0.08868372480000009
```

In [49]:

```
cdf_value=binom.cdf(k,n,p)
```

In [50]:

```
print("Probability of getting at most",k,"successes :",cdf_value)
```

```
Probability of getting at most 2 successes : 0.11891681279999998
```

In [51]:

```
mean_value=binom.mean(k,n,p)
```

In [52]:

```
print("Probability of getting at most",k,"successes :",cdf_value)
```

```
Probability of getting at most 2 successes : 0.11891681279999998
```

In [53]:

```
mean_value=binom.mean(n,p)
```

In [54]:

```
print("Mean of the binomial distribution :",mean_value)
```

```
Mean of the binomial distribution : 4.4
```

In [55]:

```
variance_value=binom.var(n,p)
```

In [56]:

```
print("Variance of the binomial distribution:",variance_value)
```

```
Variance of the binomial distribution: 2.64
```

In [57]:

```
std_deviation_value=binom.std(n,p)
```

In [58]:

```
print("Standad deviation of the binomial distribution :",std_deviation_value)
```

```
Standad deviation of the binomial distribution : 1.624807680927192
```

2.Poisson's Distribution

Q2 A

In [59]:

```
lambda_=3
```

In [33]:

```
k=2
```

In [34]:

```
pmf_value=poisson.pmf(k,lambda_)
```

In [35]:

```
print("Probability of observing ",k,"events:",pmf_value)
```

```
Probability of observing  2 events: 0.22404180765538775
```

In [36]:

```
cdf_value=poisson.cdf(k,lambda_)
```

In [37]:

```
print("Probability of observing at most",k,"events:",cdf_value)
```

```
Probability of observing at most 2 events: 0.42319008112684364
```

In [38]:

```
mean_value=poisson.mean(lambda_)
```

In [39]:

```
print("Mean of the Poisson distribution:",mean_value)
```

```
Mean of the Poisson distribution: 3.0
```

In [40]:

```
variance_value=poisson.var(lambda_)
```

In [41]:

```
print("Variance of the poisson distribution :",variance_value)
```

```
Variance of the poisson distribution : 3.0
```

In [42]:

```
std_deviation_value=poisson.std(lambda_)
```

In [60]:

```
print("standard deviation of the poisson distribution :",std_deviation_value)
```

```
standard deviation of the poisson distribution : 1.624807680927192
```

Q2 B

In [64]:

```
lambda_=4
```

In [65]:

```
k=5
```

In [66]:

```
pmf_value=poisson.pmf(k,lambda_)
```

In [67]:

```
print("Probability of observing ",k,"events:",pmf_value)
```

```
Probability of observing  5 events: 0.1562934518505317
```

In [68]:

```
cdf_value=poisson.cdf(k,lambda_)
```

In [69]:

```
print("Probability of observing at most",k,"events:",cdf_value)
```

```
Probability of observing at most 5 events: 0.7851303870304052
```

In [70]:

```
mean_value=poisson.mean(lambda_)
```

In [71]:

```
print("Mean of the Poisson distribution:",mean_value)
```

```
Mean of the Poisson distribution: 4.0
```

In [72]:

```
variance_value=poisson.var(lambda_)
```

In [73]:

```
print("Variance of the poisson distribution :",variance_value)
```

```
Variance of the poisson distribution : 4.0
```

In [74]:

```
std_deviation_value=poisson.std(lambda_)
```

In [75]:

```
print("standard deviation of the poisson distribution :",std_deviation_value)
```

```
standard deviation of the poisson distribution : 2.0
```

CONCLUSION : THE PROBLEMS FOR DISCRETE RANDOM VARIABLES USING BINOMIAL AND POISSON PROBABILITY DISTRIBUTION ARE STUDIED SUCCESSFULLY.