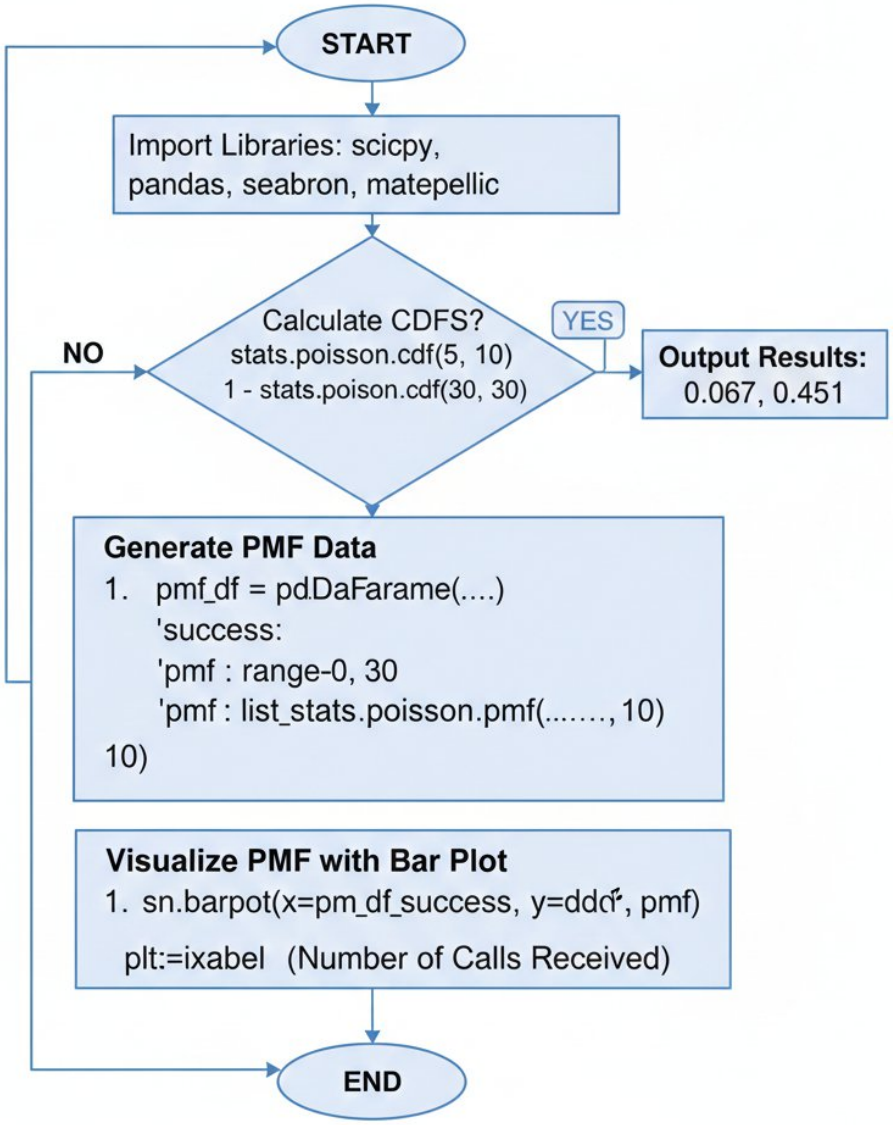
Experiment No - 1

Objective: To Study Poisson Distribution function with different dataset.

Date of experiment: 08/01/2026

Date of Completion: 08/01/2026

Flowchart:



Source Code:

```
from scipy import stats

stats.poisson.cdf (5, 10) [ Output: np.float64(0.06708596287903189) ]

1- stats.poisson.cdf (30, 30)[ Output:
np.float64(0.45164848742208863) ]

import pandas as pd

import seaborn as sn

from matplotlib import pyplot as plt

#Range (0,30) returns all values from 0 to 30 (excluding. 30) pmf_df

pmf_df = pd.DataFrame({ 'success': range (0,30), 'pmf': list (stats.
poisson.pmf (range (0,30), 10))})

# Creating a barplot with number of calls as x and pmf as y sn.barplot (x
= pmf_df.success, y pmf_df.pmf); plt.xlabel('Number of Calls
Received);

sn.barplot(x = pmf_df.success, y = pmf_df.pmf);

plt.xlabel('Number of Calls Received');
```

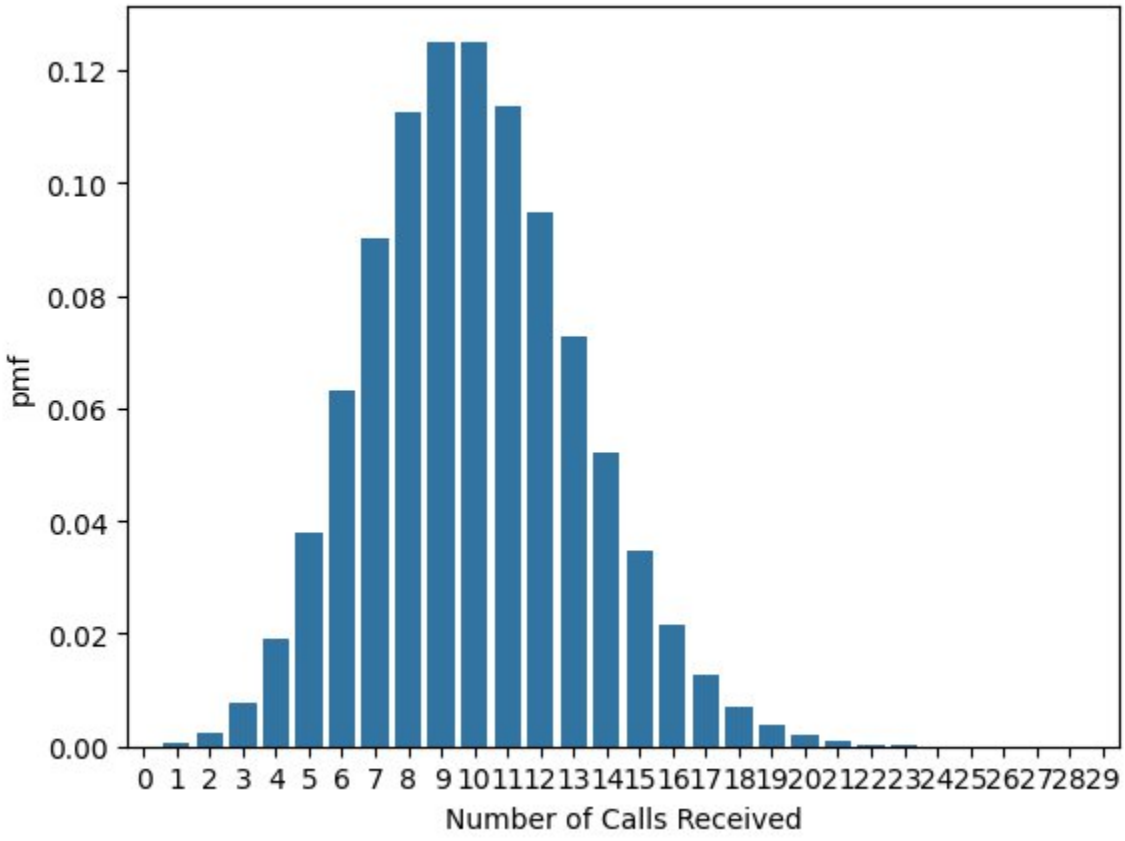
Dataset:

The notebook uses a simulated dataset representing real-world scenarios where events occur independently over time or space.

- Core Example: The primary case study models the number of calls arriving at a call center.

- Key Parameter: The average rate of arrival is set to 10 calls per hour.
- Simulated Data: The notebook generates a range of "successes" (number of calls) from 0 to 29 to calculate the Probability Mass Function (PMF) and visualize the distribution using a bar plot.
- Contextual Examples: The notebook also mentions other scenarios where this type of data applies, such as order cancellations on e-commerce portals, customer complaints, ATM cash withdrawals, and potholes on roads.

Result:



Conclusion

The analysis concludes with specific statistical insights derived from the Poisson distribution model:

- **Short-term Probability**: There is a very low probability (approximately **0.067** or 6.7%) that a maximum of 5 calls will arrive in a single hour when the average is 10.
- **Long-term Probability**: Over a 3-hour period (with an adjusted mean of 30 calls), there is a **0.451** (45.1%) probability that the number of calls will exceed 30.
- **Visualization Insight**: By plotting the PMF, the notebook demonstrates that for a mean (λ) of 10, the distribution is roughly bell-shaped and centered around the average, allowing for a clear visual assessment of the most likely number of events.