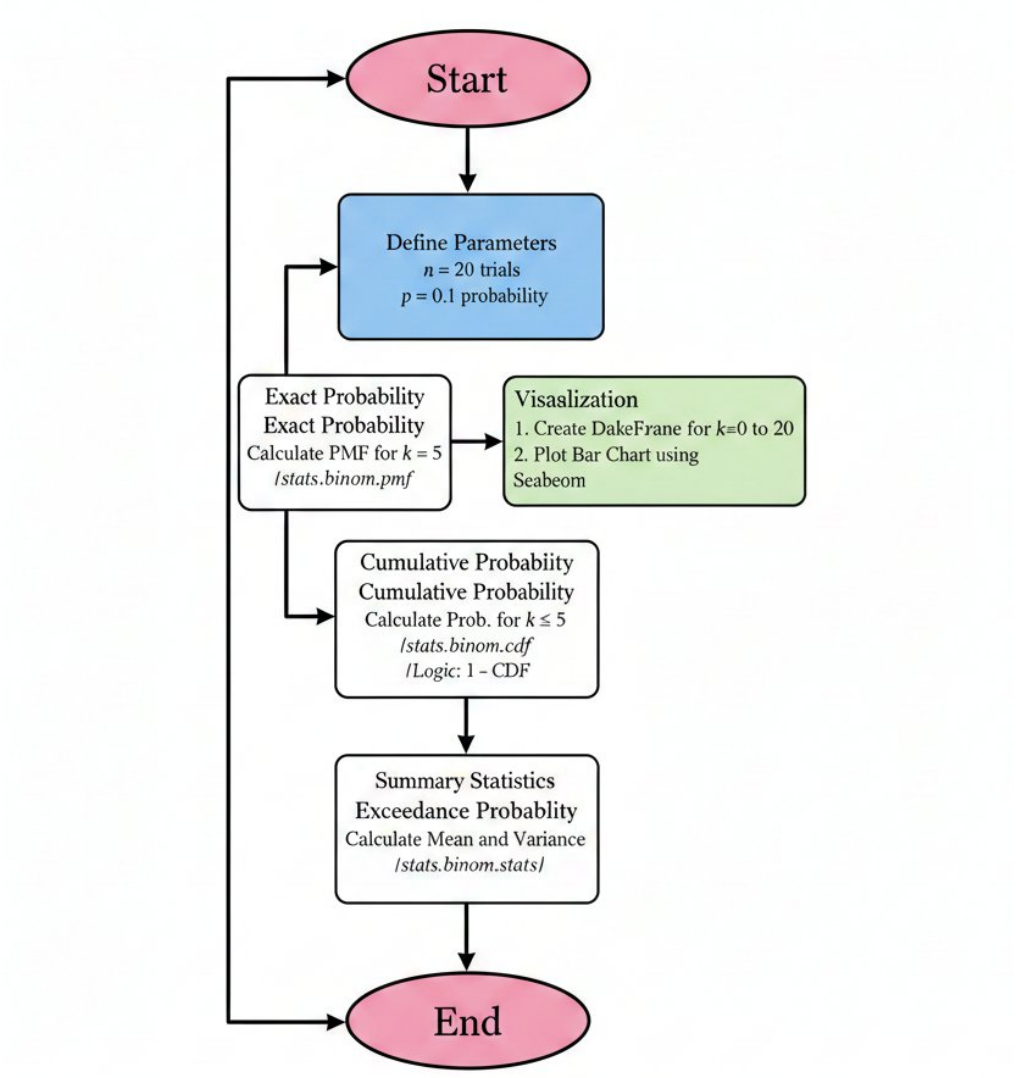
Experiment No - 1

Objective: To Study Binomial Distribution function with different dataset.

Date of experiment: 08/01/2026

Date of Completion: 08/01/2026

Flow Chart:

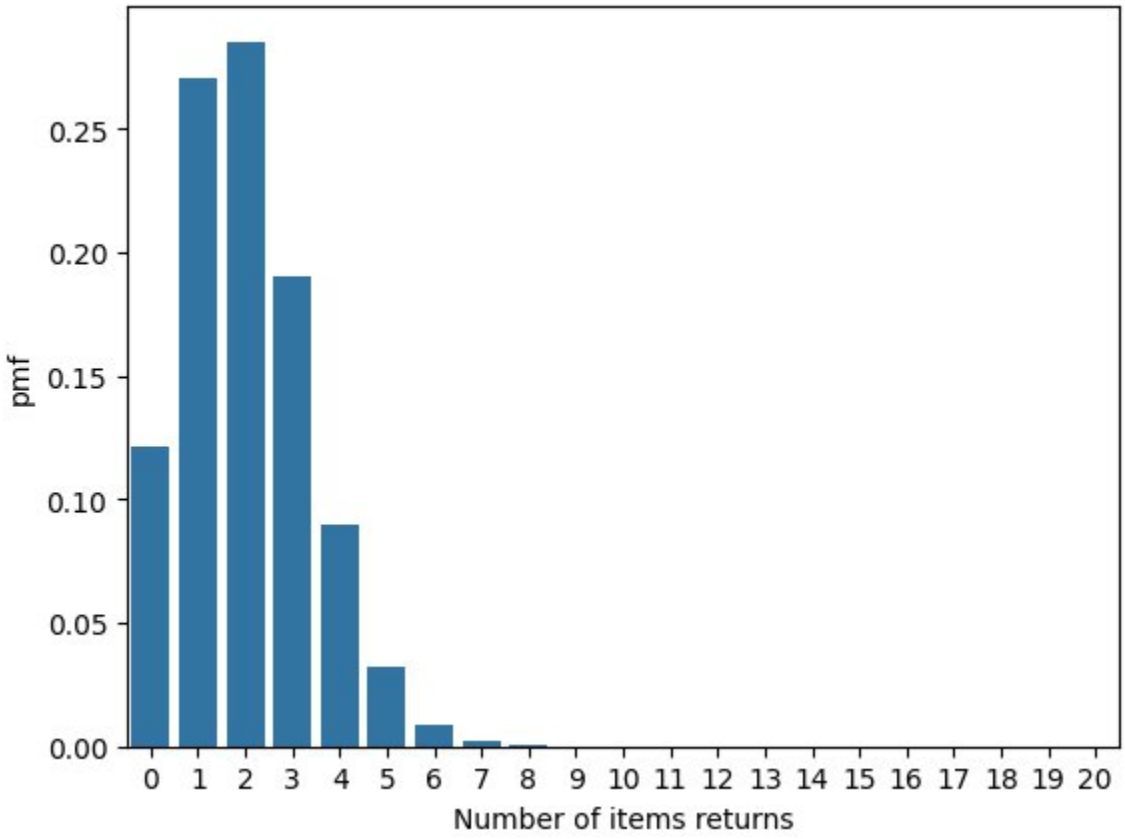


Source Code

```
from scipy import stats

stats.binom.pmf(5,20,0.1) [ Output:
np.float64(0.0319213611199544 24) ]

import pandas as pd

import seaborn as sn

import matplotlib.pyplot as plt

# range(0,21) returns all values from 0 to 20 (excluding 21)

pmf_df =
pd.DataFrame({'success':range(0,21),'pmf':list(stats.binom.pmf(range(0,
21),20,0.1))})


# Creating a bar plot with number of success as x and pmf as y

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

plt.ylabel('pmf')

plt.xlabel('Number of items returns') [ Output: Text(0.5, 0, 'Number of
items returns') ]

stats.binom.cdf(5, 20, 0.1) [ Output:np.float64(0.988746865835491) ]

1 - stats.binom.cdf(5, 20, 0.1) [ Output:
np.float64(0.011253134164509015) ]

mean, var = stats.binom.stats(20, 0.1)
```

print("Average: ", mean, " Variance:", var) [**Output**: Average: 2.0 Variance: 1.8]

Result



Conclusion

The analysis conducted in this notebook successfully models customer return behavior using the **Binomial Distribution**. By setting the parameters to $n=20$ and $p=0.1$, the following key insights were derived:

- **Probability of Specific Outcomes**: The likelihood of exactly 5 customers returning items is quite low, at approximately **3.19%**.
- **Cumulative Trends**: There is a high degree of certainty (**98.87%**) that no more than 5 customers will return their purchases.

Conversely, the probability of seeing more than 5 returns is minimal (around **1.13%**).

- **Expected Value**: On average, the business can expect **2 customers** to return items per batch of 20, with a variance of **1.8**.

This statistical approach provides a data-driven foundation for inventory management and risk assessment, allowing for more predictable logistics and financial planning.