## PYTHON PROGRAMMING:

## Use Case 3:

### Q.Design an application for Simulating Random Coin-Flips and Dice-Rolls

**AIM:**

To design and implement an application that simulates random coin flips and dice rolls using the NumPy library.

**ALGORITHM:**

1. Import the required library (numpy).

2. Ask the user how many times they want to flip the coin.

3. Use numpy.random.choice() to randomly select 'Heads' or 'Tails' for each flip.

4. Display the results of each flip.

5. Optionally, count and display the number of heads and tails. For Dice Roll Simulation:

1. Ask the user how many times they want to roll the dice.

2. Use numpy.random.randint(1, 7) to generate random integers between 1 and 6.

3. Display the results of each roll.

4. Optionally, show frequency of each outcome

## PYTHON PROGRAM:

import numpy as np import matplotlib.pyplot as plt

def flip_coin(n_flips=10): outcomes = np.random.choice(['Heads', 'Tails'], size=n_flips) return outcomes

def roll_dice(n_rolls=10): outcomes = np.random.randint(1, 7, size=n_rolls) # values 1–6 return outcomes

def show_statistics(data, title): unique, counts = np.unique(data, return_counts=True) probabilities = counts / len(data)

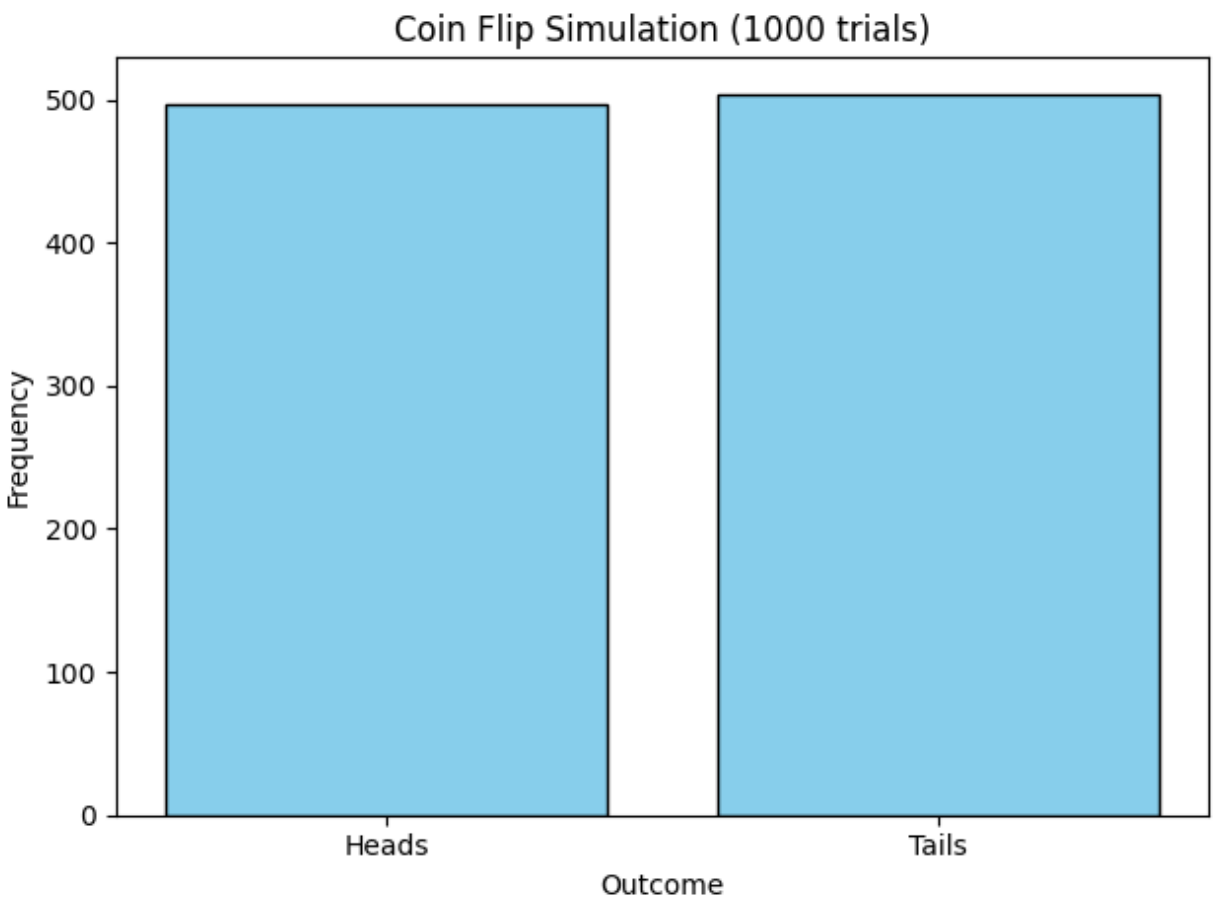
```
print(f"\n{title}")
print("-------------------------")
for u, c, p in zip(unique, counts, probabilities):
    print(f"{u}: {c} times ({p:.2%})")

# Optional: visualize
plt.bar(unique, counts, color='skyblue', edgecolor='black')
plt.title(title)
plt.xlabel('Outcome')
plt.ylabel('Frequency')
plt.show()
```

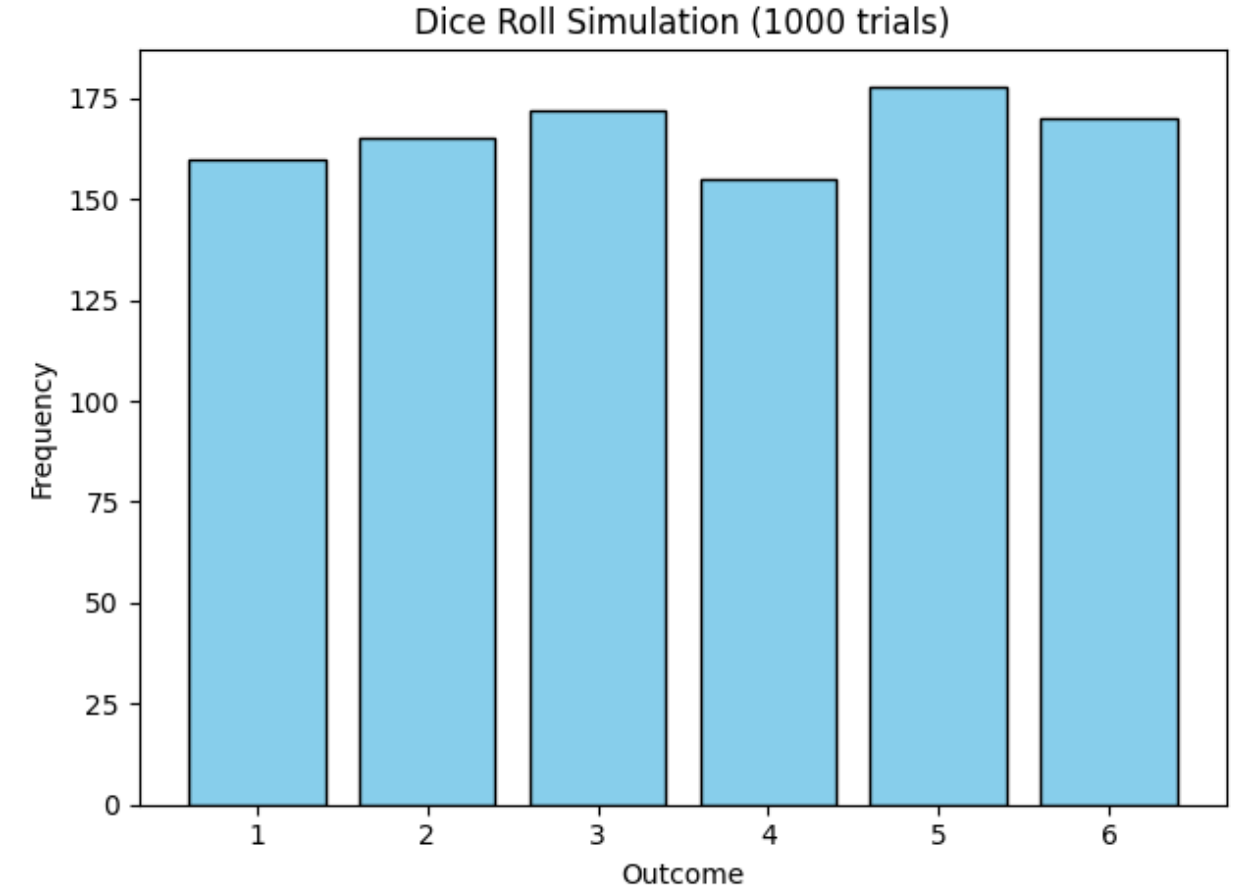
if *name* == "*main*": # Simulate 1000 coin flips coins = flip_coin(1000) show_statistics(coins, "Coin Flip Simulation (1000 trials)")

```
# Simulate 1000 dice rolls
dice = roll_dice(1000)
show_statistics(dice, "Dice Roll Simulation (1000 trials)")
```

**OUTPUT:**

```
Coin Flip Simulation (1000 trials)

-------------------------

Heads: 496 times (49.60%)

Tails: 504 times (50.40%)

Dice Roll Simulation (1000 trials)

-------------------------

1: 160 times (16.00%)

2: 165 times (16.50%)

3: 172 times (17.20%)

4: 155 times (15.50%)

5: 178 times (17.80%)

6: 170 times (17.00%)
```


Coin Flip Simulation (1000 trials)
Frequency
0
100
200
300
400
500
Heads
Tails
Outcome


Dice Roll Simulation (1000 trials)
Frequency
0
25
50
75
100
125
150
175
1
2
3
4
5
6
Outcome