# BERNOULLI DISTRIBUTION

PRESENTED BY : PEER GROUP 9

# BERNOULLI DISTRIBUTION OVERVIEW

**The Bernoulli distribution** is a discrete distribution for a single trial with two possible outcomes: success (1) and failure (0).

**Parameters**

- p: Probability of success.
- 1 - p: Probability of failure.

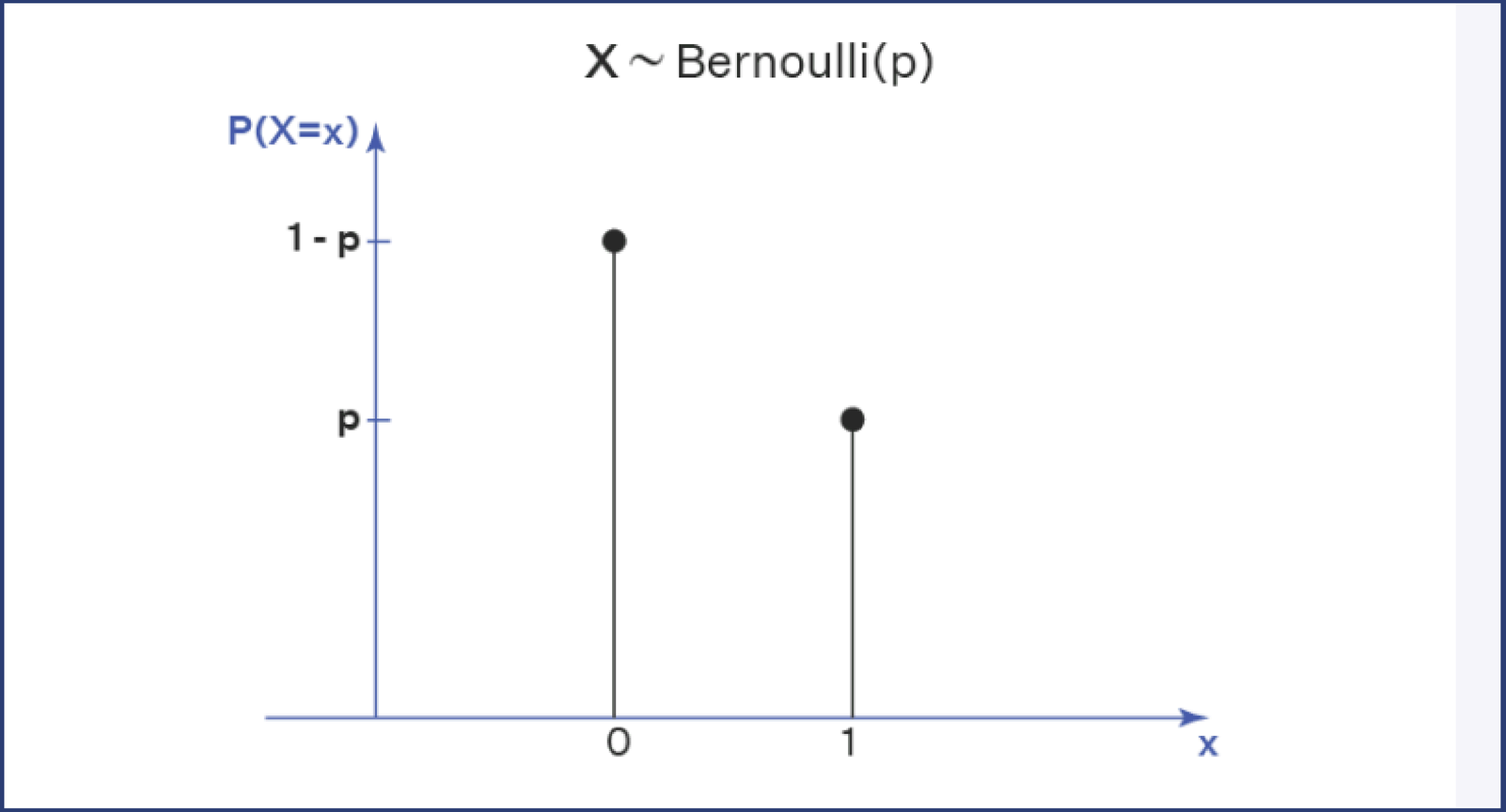
**Example**

- Flipping a coin once (p = 0.5).

**Real-world Applications**

- A single marketing call being successful or not.

# BERNOULLI DISTRIBUTION OVERVIEW




THE GRAPH SHOWS THAT THE PROBABILITY OF SUCCESS IS P WHEN X = 1 AND THE PROBABILITY OF FAILURE OF X IS (1 - P) OR Q IF X = 0.

# CHARACTERISTICS AND FORMULA

**Key Characteristics:**

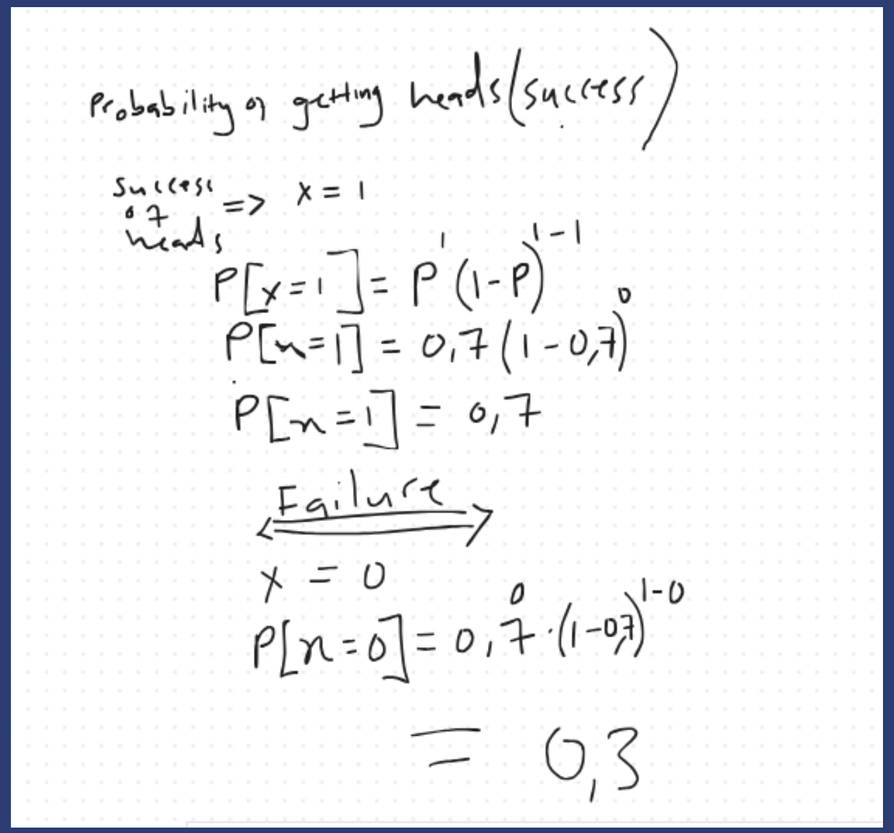
- Special case of the Binomial distribution with a single trial.
- Mean = p
- Variance = p(1 - p)

**Formula**

- P(X = x) = p^x (1 - p)^{1 - x}, where x ∈ {0, 1}

# EXAMPLE

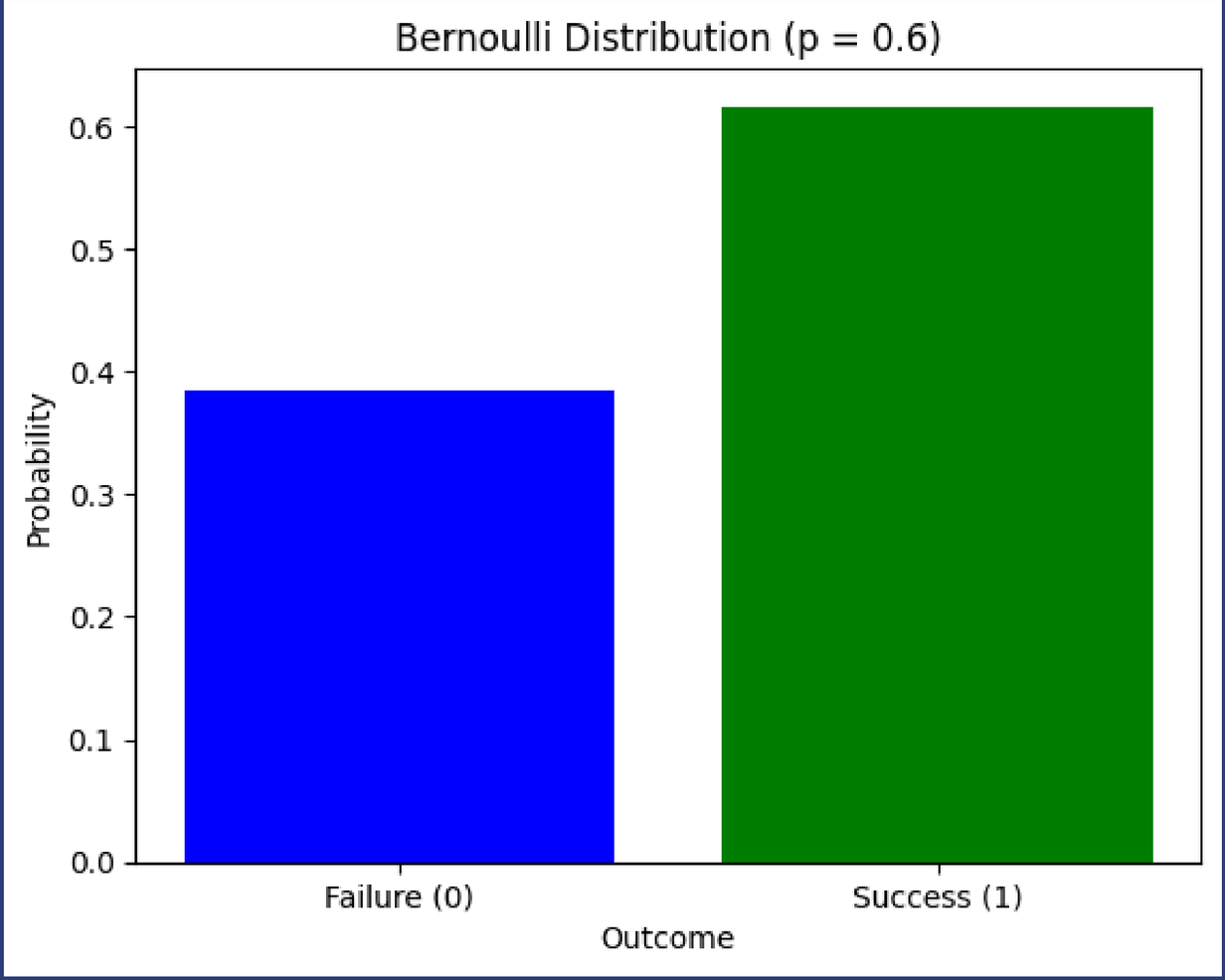
Consider a coin flip experiment where the probability of landing heads (success) is 0.7. Using the Bernoulli distribution formula



# IMPLEMENTING BERNOULLI DISTRIBUTION IN PYTHON

```python
import numpy as np
import matplotlib.pyplot as plt

# Parameters
p = 0.6  # Probability of success

# Generate 1000 Bernoulli trials
trials = np.random.binomial(n=1, p=p, size=1000)

# Count occurrences of 0 and 1
unique, counts = np.unique(trials, return_counts=True)
probabilities = counts / sum(counts)

# Plotting
plt.bar(unique, probabilities, tick_label=["Failure (0)", "Success (1)"], color=["blue", "green"])
plt.xlabel("Outcome")
plt.ylabel("Probability")
plt.title(f"Bernoulli Distribution (p = {p})")
plt.show()
```

# VISUALIZATION




The bar chart shows the probabilities for a single trial of success (1) and failure (0).

As p changes, the bar heights change, representing different probabilities.

**Example:**

- p = 0.3: Success is less likely.
- p = 0.7: Success is more likely.

# SUMMARY

**Real-world Example**

- A single sales call success (1) or failure (0). The probability (p) could be based on previous sales data.

**Summary**

- Definition: Discrete distribution with two outcomes.
- Formula: P(X = x) = p^x (1 - p)^{1 - x}
- Python Code: Simulate Bernoulli trials using numpy.
- Visualization: Bar chart representation for success and failure.