ASSIGNMENT 2

2 . Take One Domain and Draw the Graph (Normal Distribution) (Empirical Rule)

Domain: Coin Flips – Number of Heads Obtained

Consider flipping a fair coin many times (for example, 100 flips) and counting how many times it lands on heads.

Normal Distribution in Coin Flips

• When the number of flips is large, the distribution of heads follows a pattern that closely resembles a normal distribution (bell-shaped curve).

• The distribution is symmetric around the mean.

• Most outcomes cluster near the average.

• Extreme outcomes (very few or very many heads) are rare.

Mean (Average):-

• For a fair coin:

Mean = n * p

Where:

n = number of flips

p = probability of head (0.5)

• Example (100 flips):

Mean = 100 * 0.5 = 50

So, on average, we expect 50 heads.

Standard Deviation :-

Standard Deviation = sqrt[n * p * (1-p)]

For 100 flips:

sqrt[100 * 0.5 * 0.5] = sqrt[25] = 5

So, the standard deviation is 5.

Empirical Rule (68–95–99.7 Rule):-

Using:

Mean = 50

Standard Deviation = 5

• 68% of outcomes

Fall within 1 standard deviation:

50 ± 5

• 95% of outcomes

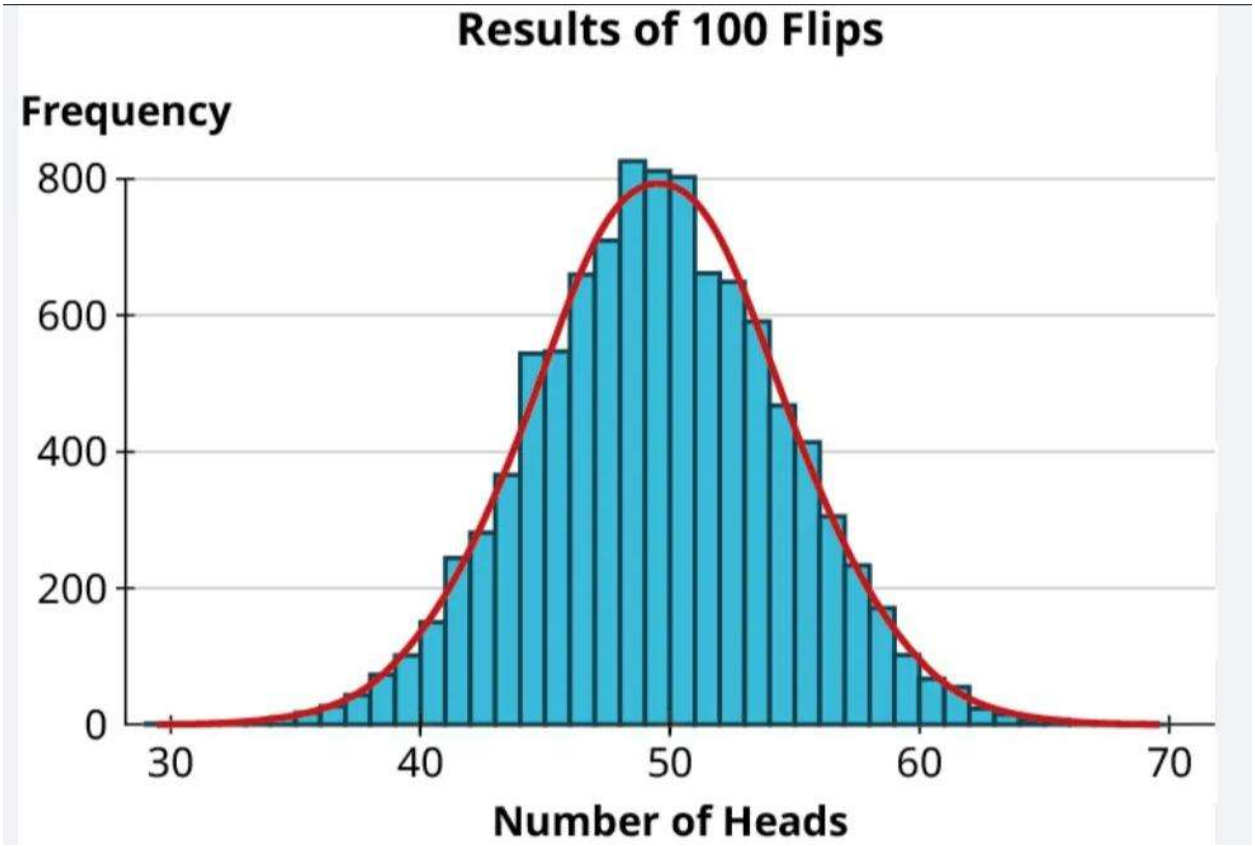
Fall within 2 standard deviations:

50 ± 10

• 99.7% of outcomes

Fall within 3 standard deviations:

50 ± 15



Interpretation :

• Getting between 45 and 55 heads is very common.

• Getting between 40 and 60 heads is highly likely.

• Getting fewer than 35 or more than 65 heads is extremely rare.

Thus, as the number of flips increases, the number of heads forms an approximately normal distribution centered around the expected value.