PART A: OBSERVATION (WRITTEN / MANUAL SOLUTION)

Chosen Algorithm

Naïve Bayes Classifier

Why Naïve Bayes?

- Suitable for text classification problems
- Simple probabilistic approach
- Performs well with small datasets
- Assumes independence between words

Dataset Used (10 Samples)

ID	Message	Class
1	Win a free mobile now	Spam
2	Meeting scheduled at 10 AM	Not Spam
3	Claim your lottery prize	Spam
4	Project deadline is tomorrow	Not Spam
5	Limited offer buy now	Spam
6	Team lunch today	Not Spam
7	Congratulations you won	Spam
8	Please review the document	Not Spam
9	Free coupons available	Spam
10	Call me when free	Not Spam

Step 1: Calculate Prior Probabilities

Total messages = 10

P(Spam)=510=0.5P(Spam) = \frac{5}{10} = 0.5P(Spam)=105=0.5
P(Not Spam)=510=0.5P(Not\ Spam) = \frac{5}{10} = 0.5P(Not Spam)=105=0.5

Step 2: Calculate Word Frequencies

Word	Spam Count	Not Spam Count
free	2	1
win	1	0
offer	1	0
meeting	0	1

Word	Spam Count	Not Spam Count
project	0	1

Step 3: Classify New Message

Test Sentence:

"Free offer available"

P(Spam|Message)∝P(Spam)×P(free|Spam)×P(offer|Spam)P(Spam | Message) ∝ P(Spam) × P(free|Spam) × P(offer|Spam)P(Spam|Message)∝P(Spam)×P(free|Spam)×P(offer|Spam)
P(Not Spam|Message)∝P(Not Spam)×P(free|Not Spam)×P(offer|Not Spam)P(Not\ Spam | Message) ∝ P(Not\ Spam) × P(free|Not\ Spam) × P(offer|Not\ Spam)P(Not Spam|Message)∝P(Not Spam)×P(free|Not Spam)×P(offer|Not Spam)

Manual Result

The posterior probability for **Spam** is higher.

Final Classification: SPAM