LAHORE UNIVERSITY OF MANAGEMENT SCIENCES Department of Electrical Engineering

EE 514 (CS 535) Machine Learning Quiz 8

Name:	
Campus ID:	
Total Marks: 10	
Time Duration: 15 minutes	

Question 1 (4 marks)

- 1. What is the main assumption behind the Naïve Bayes classifier?
 - a) Features are linearly dependent.
 - b) Features are conditionally independent given the class.
 - c) Features follow a Gaussian distribution.
 - d) Features have equal variance.
- 2. Which of the following is not a strength of Naïve Bayes?
 - a) Handles missing values.
 - b) Robust to outliers.
 - c) Works well with redundant features.
 - d) Easy to implement.
- 3. In the context of Bayesian learning, what does the MAP estimation maximize?
 - a) Only the prior probability of the parameters.
 - b) Only the likelihood of the data.
 - c) The posterior probability of the parameters given the data.
 - d) The marginal likelihood of the data.
- 4. You are working with a very small dataset that is likely not a good representative sample of the true data distribution. Considering this under-representation and assuming that a well-informed prior is used in MAP, which of the following best describes the likely effect of using MAP compared to ML?
 - a) MAP will reduce variance without significantly increasing bias, leading to better generalization than ML.
 - b) MAP will still have higher variance than ML due to the small dataset.
 - c) ML will outperform MAP because it does not rely on any assumptions.
 - d) Both MAP and ML will perform similarly since the dataset is small.

Question 2 (6 marks)

You are given the following word frequency table extracted from a text classification task distinguishing between two categories: Positive and Negative reviews.

Word	Positive Count	Negative count
great	4	1
boring	0	3
acting	2	2
script	3	1
dull	0	2
fun	2	0

Assume equal class priors. You are given the test document: "great acting dull"

- (a) [3 marks] Compute the class-conditional probabilities for each word in the document using Laplace smoothing.
- (b) [2 marks] Calculate the log probability of the document belonging to each class.
- (c) [1 mark] Based on the results, determine whether the document is more likely to be Positive or Negative.