National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Data Science	Course Code:	CS-4048	
Degree Program:	BS(Computer Science)	Semester:	Fall 2023	
Exam Duration:	60 Minutes	Total Marks:	30	
Paper Date:	10-Nov-2023	Weight	15%	
Sections:	A,B	No of Page(s):	2	
Exam Type:	Midterm-I			

Student : Name:_____ Roll No._____ Section:_____

Instruction/Notes: Attempt all question in sequence. Provide your answers in the answer booklet.
1 mark for attempting the questions in sequence.

Problem#1 (CLO-2)   **20 Marks**

	1	2	3	4	5	6	7	8	9
MID	7	15	4	13	11	10	14	12	9
FINAL	20	45	47	39	35	33	46	40	25
GRADE	D	A	B	B	B	C	A	B	C
ATTENDENCE	70	85	70	77	81	85	90	90	75
TIME STUDY	2	5	5	4	3	3	6	4	4
COURSES TAKEN	4	5	3	4	5	5	5	5	4

Perform univariate and bivariate analysis on the given data of 9 students and answer the following questions. Code is not required.

1. Which type of distribution did you observe in MID and FINAL exam? Justify your answer.
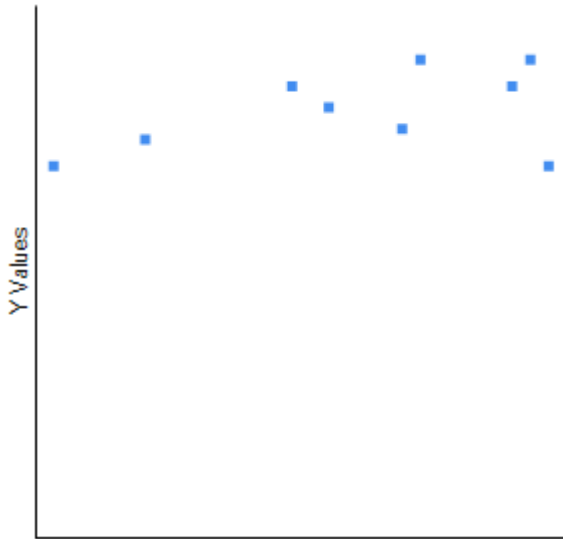
Left Skewed

2. Identify an outlier in the data and provide justification.

Data point#3 with mid marks=4 and final=47

3. Did you find any correlation between FINAL marks and attendance? Justify your answer by drawing a scatter plot.

Weak Positive

4. Draw a count plot for GRADE attribute.

5. Which plot is best suitable to visualize COURSES TAKEN attribute?

Count plot, pie chart

6. We want to predict the grades using the given attributes. How would you execute this task?

Encode the necessary variables. Take Grade as dependent variable and rest as independent variables. Use classification algorithm e.g. logistic regression to classify the records.

7. Following MID marks are received after applying transformation. Identify the type of transformation used.

[−1.015, 1.27, -1.87, 0.70, 0.13, -0.16, 0.98, 0.41, -0.44]

Standardization as the mean is approaching zero and STD as 1

8. Which transformation method is sensitive to outliers and why?

**Normalization, because it scales the largest value to 1 and lowest to 0**

9. Which techniques are used to overcome the challenges with the Gradient Decent algorithm and how?

**Moving average, Adaptive Learning rate, Regularization, Feature scaling**

10. Explain the lambda (λ) term in regularization. What is the effect of increasing/decreasing this value in L1?

Lambda defines the strength of the penalty applied. If the penalty is greater, L1 will remove the features by minimizing their coefficient values to zero.

1. Label the diagram and identify the type of optimizer used. Justify your answer.
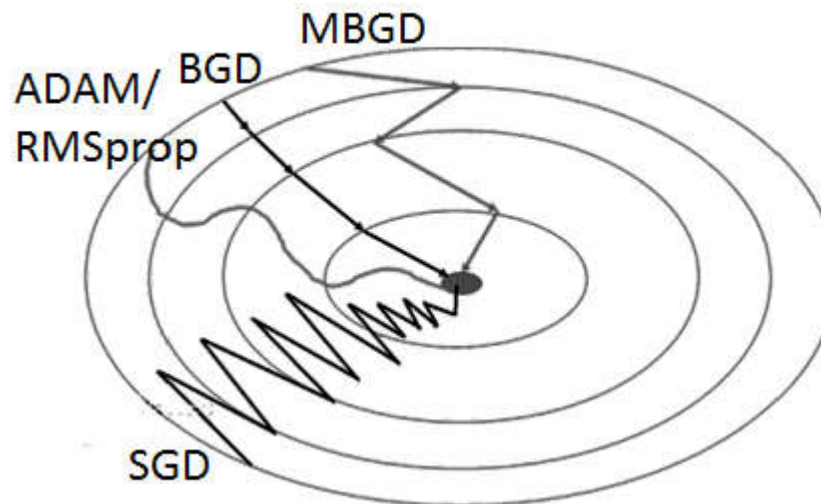
2. Describe the behavior of the three estimated functions on the given data points.
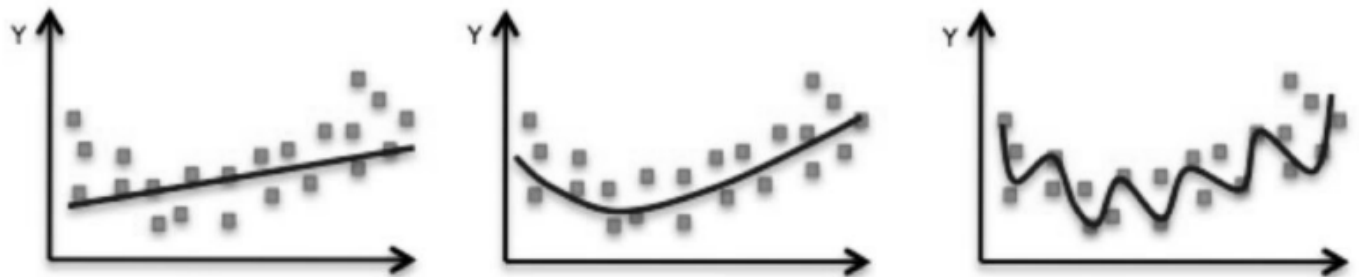
Under fitting   Ideal Curve   Over fitting

3. The given box plot and the histogram are generated from the same data. How would you justify the skewness represented in the box plot?

The data is left skewed because of the outliers on the left side of the graph.