


| National University of Computer and Emerging Sciences, Lahore Campus | | | | |
|---|------------------|----------------------------|--------------|-----------|
|  | Course: | Probability and Statistics | Course Code: | MT2005 |
| | Program: | BS(Data Science) | Semester: | Fall-2023 |
| | Instructor: | Ms. Kanwal Saleem | Total Marks: | 45 |
| | Submission Date: | 24-11-2023 | Weight | 3% |
| | Section: | All | Page(s): | 2 |
| | Evaluation | Assignment-3 (Graded) | Roll No: | |
| Instruction/Notes: | | Attempt All Questions | | |

Instructions:

Follow the given instructions carefully

- Use A4 size blank pages and blue/black pen for solving the assignment.
- Assignments submitted after the DUE DATE will not be accepted.

QUESTION 1:

(Marks=6+3)

- It is claimed that an automobile is driven on the average more than 20,000 kilometers per year with the standard deviation of 3900 kilometers. To test this claim a random sample of 100 automobile owners are asked to keep a record of the kilometers they travel. Would you agree with the claim if the random sample showed an average of 23,500 kilometers? Use a 0.01 level of significance.
- Calculate 99% confidence interval of average kilometers covered by the automobile.

QUESTION 2:

(Marks=6+2)

- Suppose the parking manager for the Los Angeles Dodgers baseball team has studied the exit times for cars leaving the ballpark after a game and believes that recent changes to the traffic flow leaving the stadium have increased, rather than decreased, average exit times. Assume that prior to the changes, the mean exit time per vehicle was 36 minutes, with a population standard deviation equal to 11 minutes. To test the parking manager's belief that the mean time now exceeds 36 minutes, a simple random sample of $n = 200$ vehicles is selected, and a sample mean of 36.8 minutes is calculated. Using an alpha level of 0.05.
- Calculate upper bound depicting maximum mean exit time.

QUESTION 3:

(Marks=6)

An electrical firm manufactures light bulbs that have a lifetime which is approximately normally distributed with a mean of 800 hours. Test the hypothesis that $\mu = 800$ hours against the alternative, $\mu \neq 800$ hours, if a random sample of 30 bulbs has an average life of 788 hours and a standard deviation of 40 hours.

QUESTION4:**(Marks=6+2+6+3)**

A study was made by a retail merchant to determine the relation between weekly advertising expenditures and sales.

| Advertising Costs (\$) | Sales (\$) |
|------------------------|------------|
| 40 | 385 |
| 20 | 400 |
| 25 | 395 |
| 20 | 365 |
| 30 | 475 |
| 50 | 440 |
| 40 | 490 |
| 20 | 420 |
| 50 | 560 |
| 40 | 525 |
| 25 | 480 |
| 50 | 510 |

- (a) Find the equation of the regression line to predict weekly sales from advertising expenditures.
- (b) Estimate the weekly sales when advertising costs are \$35.
- (c) Obtain unexplained and total variation. Also find Coefficient of determination.
- (d) Determine correlation coefficient between Advertising cost and Sales.

QUESTION 5:**(Marks=5)**

A professor in the School of Business in a university polled a dozen colleagues about the number of professional meetings they attended in the past five years (x) and the number of papers they submitted to refereed journals (y) during the same period. The summary data are given as follows:

$$n=12, \bar{x} = 4, \bar{y} = 12$$
$$\sum_{i=1}^n x^2 = 232, \sum_{i=1}^n xy = 318$$

Fit a simple linear regression model between x and y by finding out the estimates of intercept and slope. Comment on whether attending more professional meetings would result in publishing more papers.