Assignment MST-016

for

M.Sc. (Applied Statistics) (MSCAST)

Valid from January 2025 to December 2025

SCHOOL OF SCIENCES
Indira Gandhi National Open University
New Delhi - 110068

Dear Learner,

Welcome to the M.Sc. (Applied Statistics) Programme.

As per the university guidelines, you need to complete the assignment for each theory course. Note that there are no assignments for lab courses in the MSCAST programme, namely, MSTL-011, MSTL-012, MSTL-013, MSTL-014, and MSTL-015. You should remember that writing answers to an assignment's questions will improve your writing skills and prepare you for the term-end examination.

It is compulsory to submit the assignments within the stipulated time to be eligible to appear in the term-end examination. You will not be allowed to appear for the term-end examination for a course if you do not submit the assignment for that course by the due date. As per the University guidelines, if you appear in the term-end examination of a course without submitting its assignment, the result of the term-end examination is liable to be cancelled/ withheld.

The assignments constitute the continuous component of the evaluation process and have 30% weightage in the final grading.

Before you write the assignments, you are advised to first go through the self-learning material for that course and then prepare the assignments carefully by following the instructions pertaining to the assignments. Your responses should not be a verbatim reproduction of the textual materials provided for self-learning purposes, but it should be in your own words.

If you have any doubts or problems pertaining to the course material and assignments, contact the programme in charge or the academic counsellor at your study centre. If you still have problems related to this assignment, feel free to contact the course coordinator.

Wishing you all the best in successfully completing the programme.

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Instructions:

- Submit the assignments within the stipulated time. Otherwise, you will not be permitted to appear for the term-end examination.
- Solve the latest assignments uploaded for the current year/session.
- Read the instructions related to the assignments mentioned in the Programme Guide.
- Use only A-4 size paper to write your responses. It is mandatory to write all assignments neatly in your own handwriting. Typed or printed copies of the assignments will not be accepted. Note that you may use the printout only if a question specifically asks for the output of a program in MST-015 and MST-024.
- All questions given in the assignments are compulsory for each course.
- Express your response in your own words. You are advised to restrict your response based on the marks assigned to it. This will also help you to distribute your time in writing or completing your assignments on time.
- Securely fasten multiple pages together (you can staple or tie them) and number them carefully for each assignment separately.
- Do not forget to enclose the assignment question sheet of that course after the cover page of the assignment response (answer sheets). It is not compulsory to write each question separately before answering the question. Mention the question number for each answer.
- The solved assignment must be submitted at the Study Centre allotted to you before the due date set by the University. Please check the IGNOU website for updated information regarding the due date of assignment submission.
- You are advised to mention all information on the first page of the assignment response sheet, given on the next page.
- **Keep a copy of the assignment answer sheets with you before submission for future reference.**

ASSIGNMENT CODE: MST-016/TMA/2025

NAME: _____

ENROLLMENT NO: _____

ADMISSION CYCLE: _____

PROGRAMME CODE: MSCAST

COURSE CODE: MST-016

COURSE TITLE: STATISTICAL INFERENCE

REGIONAL CENTRE CODE: _____

STUDY CENTRE CODE: _____

ADDRESS: _____

_____

_____

CONTACT NUMBER: _____

EMAIL ID: _____

DATE OF SUBMISSION: _____

School of Sciences

Indira Gandhi National Open University

Maidan Garhi, New Delhi-110068 (INDIA)

TUTOR MARKED ASSIGNMENT

MST-016: Statistical Inference

Course Code: MST-016

Assignment Code: MST-016/TMA/2025

Maximum Marks: 100

Note: All questions are compulsory. Answer in your own words.

1. (a) State whether the following statements are **True** or **False**. Give reasons in support of your answer: **(5×2=10)**

(i) If X_1, X_2, X_3, X_4 and X_5 is a random sample of size 5 taken from an Exponential distribution, then estimator T_1 is more efficient than T_2.

$$T_1 = \frac{X_1 + X_2 + X_3 + X_4 + X_5}{5},\ T_2 = \frac{X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5}{15}$$

(ii) If T_1 and T_2 are two estimators of the parameter θ such that $Var(T_1) = 1/n$ and $Var(T_2) = n$ then T_1 is more efficient than T_2.

(iii) A 95% confidence interval is smaller than a 99% confidence interval.

(iv) If the probability density function of a random variable X follows F-distribution is

$$f(x) = \frac{1}{(1+x)^2}, x \geq 0$$

then degrees of freedom of the distribution will be (2,2).

(v) A patient suffering from fever reaches to a doctor and suppose the doctor formulates the hypotheses as

H_0: The patient is a chikunguniya patient

H_1: The patient is not a chikunguniya patient

If the doctor rejects H_0 when the patient is actually a chikunguniya patient, then the doctor commits type II error.

(b) Describe the various forms of the sampling distribution single mean. **(10)**

2 A baby-sister has 6 children under her supervision. The age of each child is as follows:

Child	Age (in years)
Sonu	2
Lavnik	4
Chiya	3
Amam	3
Avishi	4
Ridhi	5
Sidhi	3

(i) What is the form of population of age of children?

(ii) Prepare the sampling distribution of the sample mean when the sample size is 2.

(iii) Is the shape of the sampling distribution normal?

(iv) Calculate the mean and standard error of the sampling distribution. **(20)**

3. The department of transportation has mandated that the average speed of cars on interstate highways be no more than 70 km per hour in order. To check whether the people

followed it or not, a researcher took a random sample of 186 cars and found that the average speed was 72 km per hour with a standard deviation 0.6 km per hour.

(i) State null and alternative hypotheses.

(ii) Name the test which is suitable in this situation and why?

(iii) Calculate the value of test statistic and critical value.

(iv) Draw the conclusion on the basis of the applied test. **(20)**

4 An engineer conducted an experiment to compare two metals: iron and copper, as bonding agents for an alloy material. Components of the alloy were bonded using the metals as bonding agents, and the pressures required to break the bonds were measured. The data for the breaking pressures are given in the following table:

S. No.	Breaking Pressure	
	Iron	Copper
1	72.7	73
2	69.6	67.2
3	83.4	75.3
4	78.9	61.4
5	75	74
6	71.6	69.5
7	85.7	69.8
8	73.5	73.8
9	70.4	68
10	84.2	76.1

If the breaking pressures for both iron and copper are normally distributed, are the variances of the distributions of the breaking pressure of iron and copper equal at 5 % level of significance? **(20)**

5. Complete the following table, one is done for you:

S. No.	Test For	Name of the Test	Test Statistic
1	Population mean when population variance is known and population is normal	Z-test	$Z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}}$
2	Population mean when population variance is unknown and population is normal		
3	Difference of two population means when samples are paired, and population of		

	differences follows normal distribution.		
4	Difference of two population means when samples are independent, and population of differences follows normal distribution.		
5	Population variance when the population is normal distributed		
6	Population variance when the population is not normal distributed		

(20)