

**Subject: Statistics (STA 108)**

**Group A**

**Answer any two**

**2 x 10 = 20**

1. a. Define simple random sampling with and without replacement. Show that sample mean is an unbiased estimate of population mean.

b. Show that  $Var(\bar{y}_{st}) = \frac{1}{N^2} \sum N_2 (N_2 - n_2) \frac{sn^2}{n_n}$

When the notations have their usual meanings.

2. What do you mean by auto correction? How do you estimate it? suppose the residuals for a set of data collected over 16 consecutive time period are as follows:

Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Residuals:	-8	-7	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8

- a. Plot the residuals over time. What conclusion can you reach above the pattrty of the residuals over time?
- b. Estimate the first order autocorrelation.
3. From the following Table, test whether the color of the sons' eyes is associated with the of the fathers'

Eye colour of fathers	Eye colour of sons	
	Not light	Light
Not Light	230	148
Light	151	471

**Group B**

**Answer any eight questions**

**8 x 5 = 40**

4. show that sample variance in simple random sampling is an unbiased estimate of population Variance.
5. A sample proposes to take a stratified random sample. He expects that his field costs will be of the term . His advance estimates of relevant quantities for the two strata are as follows:
6. Prove that for Ratio estimate sampling  $Var(Y_R) = \frac{1-f}{n} y^2 (C_{yy} + C_{xx} - 2c_{yx})$
7. Discuss the difference between parametric and non-parametric test and state the advantage of non-parametric test over parametric one.
8. Define Run test Mann-Whitney u-test with suitable example.
9. Four difference methods of growing corn were randomly assigned to a large number of different plots of land and yield per acre was estimated for each plot.  
yeild rates  $S_y$  method

1	2	3	4
83	91	101	78
91	90	100	82
94	81	91	81
89	83	93	77
89	84	96	79
96	83	95	81
91	88	95	80
92	91		81
90	89		
	89		

In order to determine whether there is difference in yields as a result of the method used, apply the medium test.

10. What do you mean by Partial correlation co-efficiencies? State the relationship between simple correlation coefficients and Partial correlation coefficients.
11. Describe Cobb-Douglas production function giving suitable example.
12. From the data relating to the yield of height ( $x_2$ ) and ( $x_3$ ) 18 cinchona' plants the following correlation coefficients were obtained:

$$r_{12} = 0.77, r_{13} = 0.72 \text{ and } r_{23} = 0.52$$

Find the partial correlation co-efficiencies  $r_{12.3}$  and multiple correlations  $r_{1.23}$  and also interprets the result

13. Write short notes (any two)
  - a. Heteroscedasticity
  - b. Systematic sampling
  - c. Coefficient of determination