

Gujarat University, Ahmedabad-09
B.Sc. Semester V (Statistics STA-302)
Sampling Distributions

Marks : 70

Time: 2.30 Hours

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1. (i) Derive the moment generating function of χ_n^2 distribution. Hence determine coefficient of skewness and kurtosis. Show that as n (the degrees of freedom) tends to ∞ , chi-square distribution tends to normal distribution.
(ii) Define χ^2 -variate. Derive its probability density function.

OR

- (i) Discuss in detail any one application of χ^2 distribution.
(ii) If χ^2 is chi-square variate with n degrees of freedom, then show that $\frac{\sqrt{2\chi^2} - \sqrt{2n-1}}{\sqrt{2n-1}}$ is standard normal variate for large value of n .
2. (i) Define Student's t variate. Derive the probability density function of Student's t variate.
(ii) Derive the distribution of sample correlation coefficient r when population correlation Coefficient $\rho = 0$.

OR

- (i) Explain in detail the application of t -distribution for testing difference between two means.
(ii) Derive the expression for the mean deviation about mean of t variate with n degrees of freedom.
3. (i) Define Fisher's Z distribution. Obtain its probability density function.
(ii) Define F variate and derive its p.d.f. If F is F -variate with (n_1, n_2) d.f. then show that $\frac{1}{F}$ is F -variate with (n_2, n_1) d.f.

OR

- (i) State and prove the relation between t and F distribution.
(ii) Define Snedecor's F -distribution. Obtain expression for its mean and variance. Also show that mode of F distribution is less than unity.
4. (i) Discuss square root transformation on Poisson variate with parameter λ .
(ii) Discuss in detail Logarithmic transformation.

OR

- (i) Discuss in detail Fisher's Z -transformation for correlation coefficient.
(ii) Discuss in detail \sin^{-1} transformation.

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Semester Examination

5. Attempt any **Seven**.

- (i) State the relation between F and χ^2 distribution.
- (ii) What is the another name for Fisher's Z transformation?
- (iii) State the application of Fisher's Z distribution.
- (iv) What is the distribution of ratio of two independent chi-square variates with respective degrees of freedom m and n ?
- (v) What is the another name for Fisher's Z transformation?
- (vi) What is the mean and variance of t distribution?
- (vii) Let $t \sim t_n$. What is the distribution of t when $n = 1$? State the name of the distribution.
- (viii) Let $X \sim \chi_n^2$. State the characteristics function of X .
- (ix) Highlight the difference between normal curve and t curve.
- (x) What are the uses of variate transformation?
- (xi) State the additive property of χ^2 distribution.
- (xii) Define Fisher's t -variate.

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