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Statistics Department

Assignment – No. – 01 **Paper – STA - 304**

1 Define Chi square variate.
2 For Chi-square distribution, state and prove the additive property.
3 Establish the relation between F- and t- distributions.
4 If X and Y are two independent chi-square variates, then show that U = X / (X+Y) follows Beta Distribution of first kind.
5 For F- distribution, show that mode, if exists, then it is always less than 1
6 Derive Snedecor's F- distribution.
7 Derive Normal Distribution as the limiting case of t- distribution .
8 Derivefirst four raw moments of t- distribution.
9 Formulate a test statistic to test the hypothesis Ho: $\mu_1 = \mu_2$,when two different random samples are taken from two normal populations. with means as μ_1 *and* μ_2 respectively and common variance σ^2
10 Define Chi-square variate. In usual notations, for a chi square variate with n d.f. show that Mode = n – 2.
11 Establish the relation between F- and t- distributions.
12 Derive the Snedecor's F – distribution.
13 Show that skewness of Chi-square distribution with n degrees of freedom is $\sqrt{\frac{2}{n}}$.
14 State and prove the additive property of Chi- square distribution.
15 Derive t- distribution.
16 Derive moment s of t – distribution. Hence or otherwise, show that as $n \to \infty, \ \beta_1 \to 0 \, and \, \beta_2 \to 3$.
17 Derive the distribution of sample correlation coefficient.
18 Two random samples of sizes $n_1 \, and \, n_2$ are taken from two normal populations. Derive a test statistic to test the hypothesis that both the samples are from the same normal populations.(Assuming that population variances $\sigma_1^2 = \sigma_2^2 = \sigma^2$ **).**
19 Derive the distribution of $\frac{X}{Y}$, where $X \sim \chi^2(m)$ *and* $Y \sim \chi^2(n)$ be two independently distributed Chi-square variates with m and n d.f.
20 Show that the mode of F distribution is always less than unity.
21 Derive the probability density function of $\sum_{i=1}^{n} x_i^2$, where x_i , i = 1,2,3,……..,n are sample points of a random sample of size n taken from N(0, σ^2).

22 Establish the relation between Chi-square and F distribution.

23 State and prove the additive property of Chi- square distribution.

24 Define student's t and Fisher's t .

25 Show that student's t is a special case of Fisher's t

26 Obtain the raw moments of t- distribution

27 Derive mode of F- distribution. Hence or otherwise show that it is always less than unity

28 Derive the probability density function of $\sum_{i=1}^{n} x_i^2$, where x_i, i = 1,2,3,……..,n are sample points of a random sample of size n taken from N(0, σ^2)

29 Derive the distribution of $\frac{X}{X+Y}$, where $X \sim \chi^2(m)$ *and* $Y \sim \chi^2(n)$ be two independently distributed Chi-square variates.