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Statistics Department

Assignment – No. – 02 ***Paper – STA – 304***

1. For F- distribution, show that mode, if exists, then it is always less than 1
2. Derive Snedecor's F- distribution.
3. Derive mean and variance of *F* distribution.
4. Find first four raw moments of *F*- distribution.
5. Write a short note on variance ratio test.
6. 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.
7. Establish the relation between F- and t- distributions.
8. Derive Fisher's Z – distribution.
9. Show that the mode of F distribution is always less than unity.
10. Establish the relation between Chi-square and F distribution.
11. In usual notations, prove that if *F* has Snedecor's with *(m, n)* degrees of freedom, then, *1/F* also follows Snedecor's *F* distribution with *(n, m)* degrees of freedom.
12. If *F* follows Snedecor's F distribution with *(m=2, n)* degrees of freedom, then, show that the significance level of *F* with respect to significance probability *p*, is

$$F = \frac{n}{2}\left(p^{-2/n} - 1 \right)$$

13. If X_i ,$i=1,2,3,.....,m$ and Y_j, $j=1,2,3,....,n$ be m and n independently distributed random variables following Normal variates with zero mean and standard deviation as σ, then derive the distribution of $\frac{\sum_{i=1}^{m} X_i^2}{\sum_{j=1}^{n} Y_j^2}$

14. If a random variable X follows beta distribution witn (m,n) degrees of freedom, then show that Y = *(nx)/(n(1-x))* has Snedecor's F distribution with (m,n) degrees of freedom.
15. If X_i ,$i=1,2,$ be two independent random variables having the probability density function $f(x) = e^{-x}$, $x>0$, then show that $U= X_1 / X_2$ has F distribution.
16. State applications of Fisher's Z distribution.
17. Describe the test procedure to test the significance of observed correlation coefficient *r*, for given hypothetical value of population correlation coefficient *ρ.*
18. Derive the test procedure to test the significance of difference between two sample correlation coefficients.